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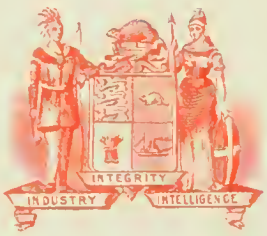

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SESSIONAL PAPERS

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SEVENTH SESSION OF THE TWELFTH PARLIAMENT

OF THE

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SESSION 1917

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OF THE

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LIST OF SESSIONAL PAPERS

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CONTENTS OF VOLUME 1.

(This volume is bound in three parts.)

1. Report of the Auditor General for the year ended 31st March, 1916, Volume 1, Parts a b and A to K; Volume II, Parts L to U; Volume III, Parts V to Z; Volume IV, Part ZZ. Presented by Sir George Foster April 19, 1917.
Printed for distribution and sessional papers.

CONTENTS OF VOLUME 2.

2. The Public Accounts of Canada, for the fiscal year ended March 31, 1916. Presented by Sir Thomas White, February 1, 1917...*Printed for distribution and sessional papers.*

3. Estimates of sums required for the service of the Dominion for the year ending on the 31st March, 1918, and in accordance with the provisions of "The British North America Act, 1867," the Governor General recommends these Estimates to the House of Commons. Presented by Sir Thomas White, January 31, 1917.
Printed for distribution and sessional papers.

4. Supplementary Estimates of sums required for the service of the Dominion for the year ending on the 31st March, 1917, and, in accordance with the provisions of "The British North America Act, 1867," the Governor General recommends these Estimates to the House of Commons. Presented by Sir Thomas White, February 5, 1917.
Printed for distribution and sessional papers.

5. Supplementary Estimates of sums required for the service of the Dominion for the year ending on the 31st March, 1918. Presented by Sir Thomas White, August 17, 1917.
Printed for distribution and sessional papers.

6. List of Shareholders in the Chartered Banks of the Dominion of Canada as on December 31, 1915. Presented by Sir Thomas White, January 25, 1917.. .. .. ..*Not printed.*

7. Report on certified cheques, drafts or bills of exchange, dividends remaining unpaid and unclaimed balances in Chartered Banks of the Dominion of Canada, for five years and upwards prior to December 31, 1915. Presented by Sir Thomas White, January 25, 1917.. .. .. .

CONTENTS OF VOLUME 4.

10. Report of the Department of Trade and Commerce for the fiscal year ended 31st March, 1916: Part I.—Canadian Trade (Imports in and Exports from Canada). Presented by Sir George Foster, April 19, 1917.. ..*Printed for distribution and sessional papers.*

CONTENTS OF VOLUME 5.

10*a*. Report of the Department of Trade and Commerce for the fiscal year ended March 31, 1916:—Part II.—Canadian Trade with France, Germany, the United Kingdom and the United States. Presented by Sir George Foster, January 25, 1917.
Printed for distribution and sessional papers.

10*b*. Report of the Department of Trade and Commerce for the fiscal year ended March 31, 1916—Part III—Canadian Trade with British and Foreign Countries (except France, Germany, United Kingdom and United States). Presented by Sir George Foster, April 19, 1917... .. ..*Printed for distribution and sessional papers.*

10*c*. Report of the Department of Trade and Commerce for the fiscal year ended March 31, 1916 (Part IV, Miscellaneous Information). Presented by Sir George Foster, June 4, 1917.. .. ..*Printed for distribution and sessional papers.*

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10*d*. Report of the Department of Trade and Commerce, Part V—Grain Statistics, compiled by the Inspection Branch of the Department, Ottawa, for the fiscal year ended March 31, 1916, the crop year ended August 31, 1916, and the season of navigation ended December 14, 1916; and Report of the Board of Grain Commissioners Presented by Sir George Foster, June 8, 1917.. .. *Printed for distribution and sessional papers.*

10*e*. Report of the Department of Trade and Commerce, for the fiscal year ending March 31, 1916 (Part VI.—Subsidized Steamship Services, with Statistics showing Steamship Traffic to December 31, 1916, and Estimates for fiscal year 1917-1918). Presented by Sir George Foster, May 3, 1917.. ..*Printed for distribution and sessional papers.*

10*f*. Report of the Department of Trade and Commerce for the fiscal year ended March 31, 1916: Part VII—Trade of Foreign Countries, Treaties and Conventions Presented by Sir George Foster, 1917.. .. ..*Printed for distribution and sessional papers.*

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11. Report of the Department of Customs for the year ended March 31, 1916. Presented by Hon. Mr. Reid, January 29, 1917.. ..*Printed for distribution and sessional papers.*

CONTENTS OF VOLUME 8.

12, 13, 14. Reports, Returns and Statistics of the Inland Revenues of the Dominion of Canada, for the fiscal year ended March 31, 1916. Part I.—Excise. Part II.—Weights and Measures, Gas and Electricity. Part III.—Adulteration of Food. Presented by Sir James Lougheed, January 26, 1917...*Printed for distribution and sessional papers.*

15. Report of the Minister of Agriculture for the Dominion of Canada, for the year ended March 31, 1916. Presented by Hon. Mr. Burrell, January 26, 1917.
Printed for distribution and sessional papers.

15*a*. Report of the Dairy and Cold Storage Commissioner for the fiscal year ending March 31, 1916. (Dairying, Fruit, Extension of Markets and Cold Storage.) Presented by Hon. Mr. Burrell, 1917.. .. ..*Not printed.*

CONTENTS OF VOLUME 8—*Concluded.*

15*b*. Report of the Veterinary Director General for the year ending March 31, 1916. Presented by Hon. Mr. Burrell, 1917... .. ..*Printed for distribution and sessional papers.*

15*c*. Report on "The Agricultural Instruction Act," 1915-16, pursuant to Section 8, Chapter 5 of 3-4 George V. Presented by Hon. Mr. Patenaude, January 31, 1917.
Printed for distribution and sessional papers.

CONTENTS OF VOLUME 9.

(This volume is bound in two parts.)

16. Report of the Director and Officers of the Experimental Farms for the year ending 31st March, 1916.—Volumes I, II and III. Presented by Sir George Foster, August 13, 1917.
Printed for distribution and sessional papers.

17. Criminal Statistics for the year ended September, 1915. (Appendix to the Report of the Minister of Trade and Commerce for the year 1915.) Presented by Sir George Foster, 1917. .. ..*Printed for distribution and sessional papers*

18. Return of By-elections for the House of Commons of Canada held during the year 1916. Presented by Hon. Mr. Speaker, 1917.. .. ..*Not printed.*

CONTENTS OF VOLUME 10.

19. Report of the Minister of Public Works on the works under his control for the fiscal year ended March 31, 1916. Presented by Hon. Mr. Rogers, January 26, 1917.
Printed for distribution and sessional papers.

CONTENTS OF VOLUME 11.

20. Annual Report of the Department of Railways and Canals, for the fiscal year from April 1, 1915, to March 31, 1916. Presented by Hon. Mr. Cochrane, April 19, 1917.
Printed for distribution and sessional papers.

20*a*. Canal Statistics for the season of Navigation, 1916. Presented by Hon. Mr. Reid, May 7, 1917... .. ..*Printed for distribution and sessional papers.*

20*b*. Railway Statistics of the Dominion of Canada, for the year ended 30th June, 1916. Presented by Hon. Mr. Cochrane, April 24, 1917.
Printed for distribution and sessional papers.

CONTENTS OF VOLUME 12.

20*c*. Eleventh Report of the Board of Railway Commissioners for Canada, for the year ending 31st March, 1916. Presented by Hon. Mr. Cochrane, January 23, 1917.
Printed for distribution and sessional papers.

20*d*. Telephone Statistics of the Dominion of Canada, for the year ended June 30, 1916. Presented by Hon. Mr. Cochrane, April 19, 1917.
Printed for distribution and sessional papers.

20*e*. Express Statistics of the Dominion of Canada, for the year ended June 30, 1916. Presented by Hon Mr. Cochrane, April 25, 1917.
Printed for distribution and sessional papers.

20*f*. Telegraph Statistics of the Dominion of Canada, for the year ended June 30, 1916. Presented by Hon. Mr. Cochrane, April 19, 1917.
Printed for distribution and sessional papers.

20*g*. Report of the Royal Commission appointed to consider the general problem of transportation in Canada, comprising:—Report of Sir H. F. Drayton and Mr. W. M. Acworth; Report of Mr. A. H. Smith; and, Appendices A and B, being Report of Appraisal of Canadian Northern Railway System and Grand Trunk Pacific Railway, by Mr. Geo. F. Swain, C.E. Presented by Sir Thomas White, May 2, 1917.
Printed for distribution and sessional papers.

CONTENTS OF VOLUME 13.

21. Forty-ninth Annual Report of the Department of Marine and Fisheries, for the year 1915-16—Marine. Presented by Hon. Mr. Hazen, January 23, 1917.
Printed for distribution and sessional papers.

22. List of Shipping issued by the Department of Marine and Fisheries, being a list of vessels on the Registry Books of the Dominion of Canada, on the 31st day of December, 1916. Presented by Hon. Mr. Hazen, September 4, 1917.
Printed for distribution and sessional papers.

23. Supplement to the Forty-ninth Annual Report of the Department of Marine and Fisheries for the fiscal year 1915-16. (Marine)—Steamboat Inspection Report. Presented by Hon. Mr. Hazen, April 19, 1917... ..*Printed for distribution and sessional papers.*

CONTENTS OF VOLUME 14.

24. Report of the Postmaster General for the year ended 31st March, 1916. Presented by Hon. Mr. Blondin, February 1, 1917...*Printed for distribution and sessional papers.*

25. Annual Report of the Department of the Interior, for the fiscal year ending March 31, 1916. Presented by Hon. Mr. Roche, January 22, 1917.
Printed for distribution and sessional papers.

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25*b*. Annual Report of the Topographical Surveys Branch of the Department of Interior, 1915-16. Presented by Hon. Mr. Roche, June 19, 1917.
Printed for distribution and sessional papers.

25*c*. Report of Hydrometric Surveys (Stream Measurements), for the calendar year 1915. Presented by Hon. Mr. Roche, April 19, 1917.
Printed for distribution and sessional papers.

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25*d*. Fifteenth Report of the Geographic Board of Canada for year ended March 31, 1916. Presented, 1917.. .. ..*Not printed.*

25*e*. Report of the British Columbia Hydrometric Survey for the calendar year 1915 (Water Resources Paper No. 18 of the Dominion Water Power Branch, Department of the Interior). Presented by Hon. Mr. Roche, July 5, 1917.
Printed for distribution and sessional papers.

25*f*. Progress Report of the Manitoba Hydrometric Survey for the calendar year 1915 (Water Resources Paper No. 19 of the Dominion Water Power Branch, Department of the Interior). Presented by Hon. Mr. Roche, July 7, 1917.
Printed for distribution and sessional papers.

CONTENTS OF VOLUME 17.

26. Summary Report of the operations of the Geological Survey, Department of Mines, for the calendar year, 1916. Presented by Hon. Mr. Meighen, August 28, 1917.
Printed for distribution and sessional papers.

26*a*. Summary Report of the Mines Branch of the Department of Mines, for the calendar year ending 31st December, 1915. Presented by Hon. Mr. Patenaude, April 19, 1917.
Printed for distribution and sessional papers.

CONTENTS OF VOLUME 18.

27. Report of the Department of Indian Affairs for the year ended March 31, 1916. Presented by Hon. Mr. Roche, January 22, 1917.
Printed for distribution and sessional papers.

28. Report of the Royal Northwest Mounted Police. 1916. Presented by Sir Robert Borden, April 19, 1917.. .. ..*Printed for distribution and sessional papers.*

CONTENTS OF VOLUME 19.

29. Report of the Secretary of State of Canada for the year ended March 31, 1916. Presented by Hon. Mr. Roche, August 18, 1917... ..*Printed for distribution and sessional papers.*

30. The Civil Service List of Canada for the year 1916. Presented 1917.
Printed for distribution and sessional papers.

31. Eighth Annual Report of the Civil Service Commission of Canada for the year ended August 31, 1916. Presented by Hon. Mr. Patenaude, April 19, 1917.
Printed for distribution and sessional papers.

32. Annual Report of the Department of Public Printing and Stationery for the fiscal year ended March 31, 1916. Presented by Sir Robert Borden, July 31, 1917.
Printed for distribution and sessional papers.

33. Report of the Secretary of State for External Affairs for the year ended March 31, 1917. Presented 1917... .. ..*Printed for distribution and sessional papers.*

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34. Report of the Minister of Justice as to the Penitentiaries of Canada for the fiscal year ending March 31, 1916. Presented 1917...*Printed for distribution and sessional papers.*

35. Report of the Militia Council for the Dominion of Canada, for the fiscal year ending March 31, 1916. Presented by Sir A. E. Kemp, February 3, 1917.
Printed for distribution and sessional papers.

36. Report of the Department of Labour for the fiscal year ending March 31, 1916. Presented by Hon. Mr. Crothers, January 22, 1917.
Printed for distribution and sessional papers.

36a. Ninth Report of the Registrar of Boards of Conciliation and Investigation of the proceedings under "The Industrial Disputes Investigation Act, 1907," for the fiscal year ending March 31, 1916. Presented by Hon. Mr. Crothers, January 22, 1917.
Printed for distribution and sessional papers.

37. Twelfth Annual Report of the Commissioners of the Transcontinental Railway, for the year ended March 31, 1916. Presented by Hon. Mr. Cochrane, April 19, 1917.
Printed for distribution and sessional papers.

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38. Report of the Department of the Naval Service, for the fiscal year ending March 31, 1916. Presented by Hon. Mr. Hazen, January 22, 1917.
Printed for distribution and sessional papers.

38a. Supplement to the Sixth Annual Report of the Department of Naval Service, Fisheries Branch,—Contributions to Canadian Biology, being studies from the biological stations of Canada, 1915-1916. Presented by Hon. Mr. Hazen, June 4, 1917.
Printed for distribution and sessional papers.

38c. Lobster Conservation in Canada, by A. P. Knight, M.A.
Printed for distribution and sessional papers.

39. Forty-ninth Annual Report of the Fisheries Branch of the Department of the Naval Service, 1915-16. Presented by Hon. Mr. Hazen, January 22, 1917.
Printed for distribution and sessional papers.

CONTENTS OF VOLUME 21—*Continued.*

40. The Report of the Joint Librarians of Parliament. Presented by Hon. Mr. Speaker, January 19, 1917... .. ..*Not printed.*

41. Copies of Orders in Council, as follows:—

P.C. 1917, dated the 15th day of July, 1916, respecting the appointment of a Parliamentary Under Secretary of State for External Affairs during the continuance of the war.

P.C. 2576, dated the 21st day of October, 1916, respecting the appointment of Hugh Clark, Member of the House of Commons for the Electoral District of North Bruce, to the position of Parliamentary Under Secretary for Exernal Affairs, during the continuance of the present war.

P.C. 1720, dated the 15th day of July, 1916, respecting the appointment of a Parliamentary Secretary of the Department of Militia and Defence, during the continuance of the present war.

P.C. 1730, dated the 19th day of July, 1916, respecting the appointment of Fleming Blanchard McCurdy, Member of the House of Commons for the Electoral District of Shelburne and Queens, to the position of Parliamentary Secretary of the Department of Militia and Defence, during the continuance of the present war.

P.C. 2651, dated the 28th day of October, 1916, respecting the establishment of a ministry in London charged with the administration of the overseas forces of Canada, and the direction and control of the expenditures abroad in connection therewith.

P.C. 2656, dated the 31st day of October, 1916, respecting the appointment of Honourable Sir George Halsey Perley, to the position of Minister of Overseas Military Forces from Canada in the United Kingdom. Presented by Sir Robert Borden, January 18, 1917.. .. ..*Printed for sessional papers only.*

42. Papers relating to the Imperial War Conference, 1917. Presented by Sir Robert Borden, January 22, 1917.. .. ..*Printed for sessional papers only.*

42*a*. Copy of a Parliamentary Paper (Cd. 8566), containing extracts from the Minutes of the Proceedings of the Imperial War Conference, 1917, and Papers laid before the Conference. Presented by Sir Robert Borden, June 15, 1917.

Printed for distribution and sessional papers.

43. Copies of Orders in Council, as follows:—

P.C. 64-15-25, dated the 29th June, 1916, authorizing the superannuation of Mr. Silas Blair Kent, a clerk in Sub-division "B" of the First Division, employed as chief fishing bounty officer of the Naval Service Department.

P.C. 3192, dated 30th December, 1916, Regulations governing the payment of Separation Allowance in the Royal Canadian Navy and Royal Naval Canadian Volunteer Reserve.

P.C. 3108, dated 19th September, 1916, Regulations governing payment of "Command Money" to officers on "Special Service," etc., in the Royal Canadian Navy.

P.C. 2942, dated 29th November, 1916, Regulations governing payment of "Hardlying Money" in the Royal Canadian Navy.

P.C. 2442, dated 11th October, 1916, Amendment to Order in Council P.C. 1334, dated 3rd June, 1916, establishing Rates of Pensions for the Military and Naval Forces of Canada.

P.C. 2130, dated 9th September, 1916, Regulations for enrolment of men in the Royal Canadian Volunteer Reserve for service in the Royal Navy.

P.C. 1939, dated 18th August, 1916, Order made under War Measures Act, 1914, to reduce risk of persons of enemy nationality landing in Canada under guise of neutrals. Presented by Hon. Mr. Hazen, January 22, 1917... .. .. ..*Not printed.*

43*a*. Copy of extract from Order in Council No. P.C. 942, dated 5th April, 1917, with reference to Regulations governing the Payment of Separation Allowance in the Royal Canadian Navy. Presented by Hon. Mr. Hazen, June 11, 1917.. .. ..*Not printed.*

43*b*. Copy of extract from Order in Council No. P.C. 1397, dated 21st May, 1917: Rules and Regulations to apply to persons who are employed in or who are in or in the vicinity of any store, wharf, etc., in or upon which any ammunition, etc., is handled. Presented by Hon. Mr. Hazen, June 14, 1917... .. ..*Not printed.*

CONTENTS OF VOLUME 21—*Continued.*

43c. Copy of Extract from Order in Council No. P.C. 1576, dated 11th June, 1917: Regulations instituting the rank of Chief Skipper and Skipper in the Royal Canadian Navy. Presented by Hon. Mr. Hazen, June 20, 1917.. .. ..*Not printed.*

43d. Copy of Order in Council, P.C. 69/1774, dated 28th June, 1917, containing Regulations for the Payment of Specialist Allowance to R.N.C.V.R and R.N.C.V.R Overseas Division. Presented by Hon. Mr. Hazen, July 9, 1917.. .. ..*Not printed*

43e. Copy Extract from Order in Council, P.C. No 1783, dated 29th June, 1917:—Rules and Regulations governing the issue of Pay, Allowances and Pensions, Department of the Naval Service—Copy Extract from Order in Council, P.C. No. 1871, dated 6th July, 1917; —Amendment to the Regulations for the payment of Separation Allowance to the dependents of those on Active Service under the Naval Service Department. Presented by Sir James Lougheed, July 12, 1917. (Senate)... .. ..*Not printed.*

43f. Extract from Order in Council, P.C. 1993 of the 17th July, 1917: Scale of Subsistence Allowances to Officers and men of the Naval Service when travelling on duty.—And also.—Extract from Order in Council, P.C. 1994 of the 17th July, 1917: Scale of Allowances in lieu of lodging, provisions, fuel and light, for Officers and men of the Naval Service. Presented by Hon. Mr. Hazen, August 6, 1917.. .. ..*Not printed.*

43g. Extract from Order in Council, P.C. 2105, dated 9th August, 1917: Amendments to regulations for the issue of pay, allowances and pensions to officers, warrant officers and men invalided, etc., from the Naval Service. Presented by Hon. Mr. Hazen, August 27, 1917... .. ..*Not printed.*

43h. Extract from Order in Council ("Defence of Canada Order"), P.C. No. 2277, dated the 17th August, 1917:—Amendments respecting Naval Service. The Senate..*Not printed.*

43i. Extract from Order in Council, No. P.C. 2433, dated 1st September, 1917:—Regulations re Pay and Allowances to Officers and Men after discharge from the Canadian Naval Service. The Senate.. .. ..*Not printed.*

44. Correspondence relating to the withdrawal of the Ross Rifle from the Canadian Army Corps. Presented by Sir Robert Borden, January 22, 1917.
Printed for sessional papers only.

45. Report of the War Purchasing Commission, covering period from its appointment on May 8, 1915, to December 31, 1916. Presented by Hon. Mr. Kemp, January 23, 1917.
Not printed.

46. Copies of Orders in Council respecting the establishment of a National Service Board of Canada, and appointments thereto, under the provisions of the War Measures Act, 1914. Presented by Sir Robert Borden, January 23, 1917.
Printed for sessional papers only.

47. Copy of Agreement between His Majesty the King and The Acadia Coal Company, Ltd., concerning the lease of the Vale Railway. Presented by Hon. Mr. Cochrane, January 23, 1917... .. ..*Not printed.*

48. Copy of Agreement between His Majesty the King and The Quebec and Saguenay Railway Co., The Quebec Railway Light, and Power Co. The Lotbinière and Megantic Railway Co., and The Quebec Railway Light Heat and Power Co., respecting the acquisition by the Government of the said railways. Presented by Hon. Mr. Cochrane, January 23, 1917.. .. ..*Not printed.*

48a. Return to an Order of the House, of the 23rd April, 1917, for a copy of all proceedings in the Exchequer Court of Canada, and judgment of Mr. Justice Cassels concerning the reference of the Quebec and Saguenay Railway, the Quebec and Montmorency Railway and the Lotbinière and Megantic Railway. Presented June 21, 1917. Mr. Lemieux.
Not printed.

CONTENTS OF VOLUME 21—*Continued.*

48*b*. Return to an Order of the House, of the 14th May, 1917, for a copy of the judgment delivered by Mr. Justice Cassels on the 24th day of January, 1917, in the matter of fixing the price to be paid by the Government for the Quebec, Montmorency and Charlevoix Railway, the Quebec and Saguenay Railway, and the Lotbinière and Megantic Railway, under the statute of last session, Chapter 22, 6-7 George V. Presented June 27, 1917. Mr. Graham.. .. ..*Not printed.*

49. Statement of Governor General's Warrants issued since the last Session of Parliament on account of 1916-17. Presented by Sir Thomas White, January 25, 1917.
Not printed.

49*a*. Statement of Governor General's Warrants issued since the adjournment of Parliament on February 7, 1917. Presented by Sir Thomas White, April 24, 1917..*Not Printed.*

50. Copy of Amendments to the Radiotelegraph Regulations since the 1st August, 1914. Presented by Hon. Mr. Hazen, January 25, 1917... .. ..*Not printed.*

50*a*. Copy of Amendment to subsection *(d)* of section 104 of the Radiotelegraph Regulations; Operation of ship stations within a Canadian harbour. Presented by Hon. Mr. Hazen, January 29, 1917.. .. ..

CONTENTS OF VOLUME 21—*Continued.*

61. Report submitted by the officer in charge of the Canadian Records Office, London, Eng., to The Right Honourable Sir Robert Borden, G.C.M.G., M.P., Prime Minister of Canada, on the work of the Canadian War Records Office since the date of its foundation to the 11th January, 1917. Presented by Sir Robert Borden, January 31, 1917.
Not printed.

62. Annual Return respecting Trade Unions under Chapter 125, R.S.C., 1906. Presented by Hon. Mr. Patenaude, January 31, 1917.. .. ..*Not printed.*

63. A detailed statement of all bonds or securities registered in the Department of the Secretary of State of Canada, since last return (22nd January, 1916) submitted to the Parliament of Canada under Section 32 of Chapter 19, of the Revised Statutes of Canada, 1906. Presented by Hon. Mr. Blondin, January 31, 1917... ..*Not printed.*

64. Return of Orders in Council which have been published in the *Canada Gazette*, between the 1st January, 1916, and the 31st December, 1916, in accordance with the provisions of Section 5 of "The Dominion Lands Survey Act," Chapter 21, 7-8 Edward VII. Presented by Hon. Mr. Roche, February 1, 1917.. .. ..*Not printed.*

65. Return of Orders in Council which have been published in the *Canada Gazette*, between 1st January, 1916, and the 31st December, 1916, in accordance with the provisions of "The Forest Reserves and Park Act," Section 19, of Chapter 10, 1-2 George V. Presented by Hon. Mr. Roche, February 1, 1917.. .. ..*Not printed.*

66. Return of Orders in Council which have been published in the *Canada Gazette*, between the 1st January, 1916, and the 31st December, 1916, in accordance with the provisions of Chapter 47, 2 George V, entitled "The Railway Belt Water Act." Presented by Hon. Mr. Roche, February 1, 1917... .. ..*Not printed.*

67. Return of Orders in Council which have been published in the *Canada Gazette* and in the British Columbia *Gazette*, between 1st January, 1916, and the 31st December, 1916, in accordance with provisions of Subsection (*d*) of Section 38 of the regulations for the survey, administration, disposal and management of Dominion Lands within the 40-mile Railway Belt in the Province of British Columbia. Presented by Hon. Mr. Roche, February 1, 1917.. .. ..*Not printed.*

68. Return showing all lands sold by the Canadian Pacific Railway Company during the year, from the 1st October, 1915, to 30th September, 1916, together with the names of the purchasers, in accordance with the Statutes of Canada, 1886, Chapter 9, Section 8. Presented by Hon. Mr. Roche, February 1, 1917.. .. ..*Not printed.*

69. Return of Orders in Council which have been published in the *Canada Gazette*, between 1st January, 1916, and the 31st December, 1916, in accordance with the provisions of Section 77 of "The Dominion Lands Act," Chapter 20, 7-8 Edward VII. Presented by Hon. Mr. Roche, February 1, 1917.. .. ..*Not printed.*

70. Certified copies of Reports of the Committee of the Privy Council, approved by His Excellency the Governor General on the 29th November, 1916, giving authority for the cancellation on and from the 1st January, 1917, of the agreements between the Government of Canada and the Governments of Manitoba, Saskatchewan and Alberta, respectively, respecting the services of the Royal North West Mounted Police in those provinces. Presented by Sir Robert Borden, February 1, 1917.
Printed for sessional papers only

70*a*. Return to an Address to His Excellency the Governor General, of the 31st January, 1917, for a copy of all documents, letters, messages, correspondence, etc., respecting the termination of the agreements between the Government of Canada and the Governments of the Provinces of Saskatchewan and Alberta in reference to the Royal North West Mounted Police. Presented June 1, 1917. Mr. McCraney.. .. ..*Not printed.*

71. Return to an Order of the House, of the 20th March, 1916, for a copy of all telegrams, letters and correspondence concerning the appointment of Mr. Alfred Gravel, Harbour Commissioner of Quebec, and concerning all other candidates for the position of Commissioner on the Harbour Board of Quebec, to represent the South Shore. Presented February 2, 1917. Mr. Bourassa... .. ..*Not printed.*

CONTENTS OF VOLUME 21—*Continued.*

72. Return to an Address to His Royal Highness the Governor General, of the 2nd February, 1914, for a copy of all Orders in Council, correspondence, petitions, telegrams and other papers or documents bearing date between the years 1885 and 1914 in any way relating to the prohibition of the export of Sockeye Salmon from the Province of British Columbia. Presented February 2, 1917.—*Mr. Sinclair*.. .. ..*Not printed.*

73. Seventh Annual Report of the Commission of Conservation for the fiscal year ending March 31, 1916. Presented by Hon. Mr. Hazen, February 5, 1917.. .. ..*Not printed.*

74. Copy of correspondence between Sir Robert Borden and Sir Wilfrid Laurier respecting proposals for the extension of the term of Parliament, November 3, 1915, to January 3, 1917. Presented by Sir Robert Borden, May 23, 1917.

Printed for sessional papers only.

75. Detailed Statement of Customs Duties and the Refund thereof, under Section 92, Consolidated Revenue Act, for the year ended March 31, 1916. (Senate)... ..*Not printed.*

75*a*. Detailed Statement of all Remissions and Refunds of the Tolls or duties for the fiscal year ending March 31, 1916.—Also,—Supplementary statement of the Remissions and Refunds of Tolls and Duties from the Department of Marine and Fisheries. Presented by Hon. Mr. Patenaude, April 19, 1917.. .. .. *Not printed.*

76. Ordinances of the Yukon Territory, passed by the Yukon Council in 1916. (Senate).

Not printed.

76*a*. Return of Orders in Council passed under the provisions of Section 18, of Chapter 63, Revised Statutes of Canada, "An Act to provide for the Government of the Yukon Territory." Presented by Hon. Mr. Patenaude, April 19, 1917.. .. ..*Not printed.*

76*b* Return of Orders in Council passed in the year 1917, under the provisions of Section 18, of Chapter 63, Revised Statutes of Canada, "An Act to provide for the Government of the Yukon Territory." Presented by Hon. Mr. Sevigny, July 5, 1917.

Not printed

77. Copy of extract from Order in Council No. P.C. 43/263, dated 27th January, 1917, authorizing Regulations governing the payment of Allowance for the Accountant Officers in the Royal Canadian Navy of Receiving Ships and Depot Ships, in accordance with the provisions of Secton 47, Chapter 43, 9-10 Edward VII. Presented by Hon. Mr. Hazen, February 6, 1917.. .. ..*Not printed.*

78. Return to an Order of the House of the 31st January, 1917, for a copy of all correspondence respecting the appointment of a Commission to investigate the financial and economic condition of Canadian railways, showing the names of the Commissioners, the rate of their remuneration, along with the names of the secretaries and engineers appointed by them, or by the Commission, and the rate of their remuneration. Presented February 6, 1917.—*Sir Wilfrid Laurier*.. .. ..*Not printed.*

79. Return to an Order of the House of the 31st January, 1917, for a copy of all papers, letters, telegrams and other documents relative to the removal of Mr. H. D. McKenzie as mechanical foreman at Stellarton on the Canadian Government Railways, and the appointment of his successor. Presented February 6, 1917.—*Mr. Macdonald.*

Not printed.

80. Return to an Order of the House of the 31st January, 1917, for a return showing the quantity of freight carried over the Grand Trunk Pacific Railway between Lévis and Moncton since that portion of said railway has been operated by the Canadian Government Railways System. Presented February 6, 1917.—*Mr. Copp*.. .. ..*Not printed.*

81. Return to an Order of the House of the 12th April, 1916, for a Return showing:—1. How many clerks there are in the Interior Department who belong to and are paid from the outside service vote and who work in the inside service? 2. The names of said clerks? 3. Salary paid to each? 4. How long each has been in the service of the Department? 5. If all or any of these clerks have passed any examination and on what date or dates? Presented February 6, 1917.—*Mr. Turriff*.. ..*Not printed.*

CONTENTS OF VOLUME 21—*Continued.*

82. Return to an Order of the House of the 15th March, 1916, for a copy of all correspondence between the Government and the Provinces, regarding increased co-operation in the promotion of immigration and land settlement, commencing with a letter of the Minister of the Interior to the Provincial Prime Ministers, in November, 1911. Presented February 6, 1917.—*Sir Wilfrid Laurier*... .. ..*Not printed.*

83. Return to an Order of the House of the 27th March, 1916, for a Return showing:—1. The names and salaries of the persons employed in the Immigration Service in the City of Montreal; their respective salaries when appointed and what they receive at the present time? 2. Which of such employees are given travelling or other expenses, and how much has been been paid to each on that account since their respective appointments. Presented February 6, 1917.—*Mr. Lachance*.. .. ..*Not printed.*

84. Return to an Order of the House of the 31st January, 1917, for a return showing the quantities of timber cut, and the sum paid therefor, to date, under the lease or sale of timber made by the Indian Department to Mr. Arthur Webber from lands situated near Ship Harbour Lake, Halifax County, together with the name or names of all surveyors of the timber cut from the said Indian lands under the above-mentioned sale or lease, and copies of all reports made in connection therewith by said surveyors. Presented February 6, 1917.—*Mr. McLean (Halifax)*... .. ..*Not printed.*

85. A copy of the Special Report made by the Royal Commission on Indian Affairs on the Kitsilano Indian Reserve, together with the Order in Council passed on the 28th March, 1916, and all other papers and correspondence relating to the Report. (Senate). *Not printed.*

86. Return to an Address to His Excellency the Governor General, of the 31st January, 1917, for a copy of all correspondence exchanged between the Dominion Government and the Provincial Governments inviting them to a conference on the subject of making provisions for returned soldiers, including a copy of the proceedings of the conference which took place on the 10th of January at Ottawa on the same subject. Presented February 7, 1917.—*Sir Wilfrid Laurier* .. ..*Printed for sessional papers only.*

87. Return to an Order of the House, of the 31st January, 1917, for a copy of all correspondence between any Member of the Government and Sir Thomas Tait referring to his appointment to, and resignation from, the National Service Board. Presented February 7, 1917.—*Mr. Graham*.. .. ..*Printed for sessional papers only.*

87*a*. Return to an Order of the House of the 31st January, 1917, for a copy of all correspondence between Mr. Murray, Secretary of the Manufacturers' Association, and any Member of the Government, or Sir Thomas Tait, as head of the National Service Board, concerning his suggested appointment as Secretary of the National Service Board. Presented June 1, 1917.—*Mr. Graham*.. .. ..*Not printed.*

88. Correspondence between the Prime Minister and the Leader of the Opposition concerning the formation of a Parliamentary National Service Commission. Presented by Sir Robert Borden, February 7, 1917... .. ..*Printed for sessional papers only.*

89. Return to an Order of the House, of the 5th February, 1917, for a copy of all petitions, letters, telegrams, reports and other documents relative to the closing of the Canard and Splitlog Post Office and the opening of Loiselleville Post Office, in the County of Essex, together with a copy of all petitions and documents relative to the establishment of rural mail routes from the Loiselleville Post Office. Presented February 7, 1917.—*Mr. Wilcox*.. .. ..*Not printed.*

90. Report on the Canadian Army Medical Service, by Colonel Herbert A. Bruce, Special Inspector General, Medical Services, Canadian Expeditionary Force, dated at London, England, 20th September, 1916. Presented by Sir Robert Borden, February 7, 1917. *Not printed.*

90*a*. Report on the Canadian Army Medical Service, by a Board of Officers, presided over by Surgeon-General Sir William Babtie, K.C.M.G., C.B., V.C., dated at London, England, December 22, 1916. Presented by Sir Robert Borden, February 7, 1917..*Not printed.*

CONTENTS OF VOLUME 21—*Continued.*

90*b*. Copy of Interim Report of the Surgeon-General G. C. Jones, Director Medical Services. Canadians, in reply to the Report on the Canadian Army Medical Service by Colonel Herbert A. Bruce, Special Inspector-General, Medical Services, Canadian Expeditionary Force, dated London, September 28, 1916. Presented by Sir Edward Kemp, May 31, 1917.. .. ..*Not printed.*

91. Return to an Order of the House, of the 7th February, 1917, for a copy of all letters, telegrams, papers and other documents relative to the closing of the Marine Agency at Pictou last autumn, and as to the re-opening of said agency. Presented April 19, 1917. —*Mr. Macdonald*.. .. ..*Not printed.*

92. Return to an Order of the House of the 5th February, 1917, for a Return showing:—1. The number of horses that have been bought in Canada for war purposes in each of the years 1914, 1915 and 1916, respectively, (*a*) for the Canadian Army; (*b*) for Britain; and (*c*) for France and our other Allies. 2. The amount paid for the horses in each of the years for the different countries mentioned. Presented April 19, 1917.—*Mr. Edwards*.. .. ..*Not printed.*

93. Return to an Order of the House of the 31st January, 1917, for a Return showing:—1. The names, home addresses and former occupations of all censors, decoders or other employees of the Government in the different cable stations in Nova Scotia during the calendar year 1916. 2. The name of the person who recommended each of the said censors, decoders or employees. 3. What salary was paid to each of said persons for the calendar year 1916. Presented April 19, 1917.—*Mr. Sinclair*.. ..*Not printed.*

94. Copies of General Orders promulgated to the Militia for the period between December 30, 1915, and February 8, 1917. Presented by Sir Edward Kemp, April 19, 1917.
Not printed.

95. Return to an Order of the House of the 11th March, 1915, for a copy of all charges, correspondence, letters, telegrams and other documents relative to the dismissal of Frank Dunlop, of Graves Point, at Sydney Mines, in the riding of North Cape Breton and Victoria, N.S., and the expenses of such investigation in detail. Presented April 19, 1917.—*Mr. McKenzie*.. .. ..*Not printed.*

96. Return to an Order of the House of the 3rd April, 1916, for a Return showing:—1. The names of the staff in the office of the High Commissioner for Canada in London? 2. Whether any of these officials are natives of Canada. If so which ones? 3. Whether it is true, as alleged, that Canada is the only British Dominion which employs none of its natives in its High Commissioner's Office. Presented April 19, 1917.—*Mr. Proulx.*
Not printed.

97. Return to an Address to His Royal Highness the Governor General, of the 22nd February, 1915, for a copy of all Orders in Council, memoranda, correspondence or other documents in the possession of the Government, or any Department thereof, relating to the trade in dried fish and wines between Portugal and Canada. Presented April 19, 1917.— *Mr. Sinclair*.. .. ..*Not printed.*

98. Return to an Order of the House of the 31st January, 1917, for a tabulated statement showing the number of divorces granted by the Parliament of Canada since 1867. Presented April 19, 1917.—*Mr. Lemieux*.. .. ..*Not printed.*

99. Return to an Order of the House of the 3rd February, 1916, for a copy of all letters, telegrams and other documents, including tenders, relating to the mail contract from Tatamagouche to New Annan and Tatamagouche Mountain, in the County of Colchester. Presented April 19, 1917.—*Mr. Macdonald*.. .. ..*Not printed.*

100. Copy of new Rule in substitution of Rule 236 of the General Rules and Orders now in force regulating the practice and procedure in the Exchequer Court of Canada, made on the 16th day of February, 1917. Presented by Hon. Mr. Patenaude, April 19, 1917.
Not printed.

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100a. Copy of Rule 200 of the General Rules and Orders now in force regulating the practice and procedure in the Exchequer Court of Canada; also, Copy of General Order respecting fees and costs in the Exchequer Court in the exercise of its jurisdicton as a Court of Admiralty. Presented by Hon. Mr. Patenaude, May 3, 1917.....*Not printed.*

101. Return to an Order of the House of the 5th February, 1917, for a return showing a list of all persons employed during the year 1916 in the round-house of the Canadian Government Railways at Pirate Harbour, N.S., as brakemen, telegraphers, cleaners and labourers, showing the dates of their appointments and length of time employed respectively, and also the monthly rate of wages paid to each of said employees. Presented April 19, 1917.—*Mr. Sinclair*.. .. ..*Not printed.*

102. Return to an Order of the House of the 31st January, 1917, for a copy of all letters, papers, telegrams and other documents relative to the application for, and the granting of, a Conciliation Board to the employees of the Acadia Coal Company in the spring of 1916, the proceedings of said Board, and all other papers in relation to the same. Presented April 19, 1917.—*Mr. Macdonald*.. .. ..*Not printed.*

103. Return to an Order of the House of the 31st January, 1917, for a copy of all correspondence, telegrams and documents of all kinds exchanged between any person or persons and the Department of Labour or any other Department of the Government relating to the labour trouble at Thetford Mines, P.Q., and also copies of all correspondence exchanged between the different Departments of the Government respecting the same question. Presented April 19, 1917.—*Mr. Verville*.. .. ..*Not printed.*

104. Return to an Order of the House of the 31st January, 1917, for a copy of all letters, papers, telegrams and other documents relative to the application for, and the refusal to grant a Conciliation Board as petitioned for under the Industrial Disputes Investigation Act by the employees of the Canadian Government Railway at Pictou, who were members of the Longshoremen's Union at Pictou during the year 1916. Presented April 19, 1917.—*Mr. Macdonald*.. .. ..*Not printed.*

105. Return to an Order of the House of the 7th February, 1917, for a copy of the contract between the Government and the P. Lyall & Sons Construction Company for the reconstruction of the Parliament Building. Presented April 20, 1917.—*Mr. Murphy.*
Printed for Sessional Papers only.

106. Copy of Order in Council P.C. 1062, dated 16th April, 1917, ordering that wheat, wheat flour and semolina be transferred to the list of goods which may be imported into Canada free of duty of customs. Presented by Sir Thomas White, April 20, 1917.
Printed for Sessional Papers only.

107. Return to an Order of the House of the 19th April, 1917, for a return showing:—1. Whether the Government is aware as to whether there are cases in the Military Service in which men after enlistment have been given leave on harvesting furlough, and during such leave have been injured by accident, and who have in consequence of such accident incurred hospital bills, and who having been treated in hospital have returned to military duty and been discharged on account of injuries so received. 2. If so, whether claims have been made for hospital care and treatment. 3. If such claims have been recognized by the Government. 4. If not, why not. 5. If so, what action has been taken in connection therewith. 6. Whether in such cases the enlisted person is not entitled to pay up to time of discharge, and also the payment of his hospital account. Presented April 20, 1917.—*Mr. MacNutt*.. .. ..*Not printed.*

108. Copy of a communication from the Deputy Minister of Militia and Defence, relative to the total value of the Oliver equipment, so-called, supplied the Canadian soldiers who have crossed to England since the commencement of the present war. Presented by Sir Edward Kemp, April 20, 1917.. .. ..*Not printed.*

109. Return to an Order of the House of the 19th April, 1917, for a return showing:—1. The names of the Members of Parliament who now belong, or who did belong to the Overseas

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Forces or the Militia Forces of Canada since the present war was declared. 2. Whether these Members or any of them were, or are in receipt of pay from the Militia Department and in receipt of their indemnity as Members at the same time. 3. Whether the wives of these Members, or any of them were, or are in receipt of separation allowance. Presented April 20, 1917.—*Mr. Hughes (Kings, P.E.I.)*.. .. ..*Not printed.*

109a. Supplementary return to an Order of the House of the 19th April, 1917, for a return showing:—1. The names of the Members of Parliament who now belong, or who did belong to the Overseas Forces or the Militia Forces of Canada since the present war was declared. 2. Whether these Members, or any of them were, or are in receipt of pay from the Militia Department and in receipt of their indemnity as Members at the same time. 3. Whether the wives of these Members, or any of them were, or are in receipt of separation allowance. Presented April 24, 1917.—*Mr. Hughes (Kings, P.E.I.)*. . ..*Not printed.*

109b. Return to an Order of the House of the 25th April, 1917, for a return showing:—1. How many Members of the House of Commons are serving or have served in the Canadian Army. 2. The names of each of said Members, the date of appointment, and rank. 3. The names of those Members who have resigned or have withdrawn from military service and the date of withdrawal or resignation. 4. How much has been paid to each for military salary, expenses and separation allowance to wife or relatives, respectively. Presented May 31, 1917.—*Mr. Turriff*.. .. ..*Not printed.*

109c. Corrected copy of a return to an Order of the House of the 25th April, 1917, for a return showing:—1. How many Members of the House of Commons are serving or have served in the Canadian Army. 2. The names of each of said Members, the date of appointment, and rank. 3. The names of those Members who have resigned or have withdrawn from military service and the date of withdrawal or resignation. 4. How much has been paid to each for military service, expenses and separation allowance to wife or relatives, respectively. Presented June 14, 1917.—*Mr. Turriff*.. .. ..*Not printed.*

110. Return to an Order of the House of the 19th April, 1917, for a return showing:—1. What amounts have been given to the Canadian Patriotic Fund to December 31, 1916, and what amounts have been promised for 1917, by the different counties, towns and cities in each of the different provinces. 2. The names of the different counties, towns and cities, and the respective amounts subscribed and promised by each. 3. What counties, cities and towns in each province, if any, have not contributed any amount to the said fund up to the present time. Presented April 24, 1917.—*Mr. Edwards*.. ..*Not printed.*

110a. Return to an Order of the House of the 19th April, 1917, for a return showing:—1. How much money has been subscribed and voted to the Canadian Patriotic Fund by each of the different provinces to December 31, 1916. 2. How much money has been paid to the Canadian Patriotic Fund by each of the different provinces during the same time. 3. How much money has been promised by county, township, city or other grants by each province for the year 1917. 4. How many persons in each province have received assistance from the Canadian Patriotic Fund to December 31, 1916. 5. The total amount so expended in each province. Presented April 24, 1917.—*Mr. Edwards*.. ..*Not printed.*

111. Copy of Order in Council P.C. 802, dated 23rd March, 1917, in respect to taking over of the Ross Rifle Factory by the Government of Canada. Presented by Sir Edward Kemp, April 24, 1917.. .. ..*Not printed.*

112. Return to an Order of the House of the 31st January, 1917, for a copy of all documents, letters, telegrams and other correspondence in the Department of the Interior, relating to grazing leases numbers 2785, 2803, 2843, 3701, 3998, 4603, 5566, 6220 and 6221. Presented April 25, 1917.—*Mr. Steele*.. .. ..*Not printed.*

113. Memorandum from the Superintendent of Immigration respecting the advertising by the Canadian Government in United States newspapers for farm hands to work in Canada; together with a copy of the advertisements and instructions concerning the same. Presented by Hon. Mr. Roche, April 25, 1917.. .. ..*Not printed.*

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114. Copies of Orders in Council:—

P.C. 341, dated the 7th day of February, 1917, respecting the exportation of newsprint paper in sheets or rolls by license only under regulations by the Minister of Customs.

P.C. 445, dated the 17th day of February, 1917, containing orders and regulations respecting the price, sale, control, distribution, transport, etc., of newsprint paper in sheets or rolls.

P.C. 1059, dated the 16th day of April, 1917, empowering the Minister of Customs to fix the quantity and price of newsprint paper furnished or to be furnished to the publishers in Canada by the manufacturers; and controlling the distribution and delivery of the same.

P.C. 1060, dated the 16th day of April, appointing R. A. Pringle a commissioner to conduct an inquiry into and concerning the manufacture, sale, price and supply of newsprint paper within the Dominion of Canada. Presented by Sir Thomas White, April 26, 1917.. .. .. .

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and all other persons, concerning either the construction or repairing or purchase of the wharves at the following places: Ile Perrot Snd. the Church in the Village of Ile Perrot, the Village of Vaudreuil, Pointe Cavagnal, Hudson, Rigaud, Graham, Pointe Fortune, and Ile Perrot Nord. Also, a copy of all specifications and reports already brought down at my request in relation to the documents prior to and since 1904, and a statement of the amounts that have been paid for such construction or repairs, and to whom they were paid. Presented April 30, 1917.—*Mr. Boyer*.. .. ..*Not printed.*

122*c*. Return to an Order of the House of the 16th February, 1916, for a copy of all letters, petitions, correspondence, telegrams and reports, exchanged between the Government, the engineers residing in the district, and all other persons, concerning the construction and repairing done to the wharves mentioned below, since 1904, and of all data and reports already produced at my request and relating to documents prior to 1904; also the amounts of money paid for such construction and repairing, and to whom paid:—The wharf at Ile Perrot North, South, and at the Church; of the Village of Vaudreuil; of Pointe Cavagnal; of Hudson; of Graham; of Rigaud, and of Pointe Fortune. Presented April 30, 1917.—*Mr. Boyer*.. .. ..*Not printed.*

122*b*. Return to an Order of the House of the 30th April, 1917, for a copy of all letters, petitions, correspondence, telegrams and reports exchanged between the Government, the resident engineer and all other persons, concerning the construction and repairing done to the wharves at Ile Perrot North, South and at the Church; Village of Vaudreuil, Pointe Cavagnal, Hudson, Graham, Rigaud and Point Fortune since 1904. Also, a copy of all data and reports regarding above already produced at my request relating to documents prior to 1904, showing the amounts of money paid for such construction and repairing, and to whom paid. And also, return to an Order of the House of the 30th April, 1917, for a copy of all letters, petitions, correspondence and telegrams exchanged between the Government, the district engineer, and any other persons concerning either the construction, repairing or purchase of the wharves at Ile Perrot South, the Church in the Village of Ile Perrot, Village of Vaudreuil, Pointe Cavagnal, Hudson, Rigaud, Graham, Pointe Fortune and Ile Perrot North, since 1904. Also a copy of all specifications and reports already brought down at my request in relation to above prior to, and since 1904, giving a statement of the amounts that have been paid for such construction or repairs, showing to whom they were paid. Presented August 13, 1917.—*Mr. Boyer.*

Not printed.

123. Return to an Order of the House of the 19th April, 1916, for a copy of all letters, petitions, correspondence and telegrams exchanged between the Government, its resident engineer, and all other prsons, concerning the dredging work done at the following places:—Ste. Anne de Bellevue, Pointe Fortune, Ottawa River Channel between Ile au Foin and Ile à Paquin, Graham channel, Rigaud channel, Hudson Heights channel, Hudson, Como, Pointe Cavagnal, channel at Vaudreuil Village, Dorion Bay channel, Ile Perrot Church, Ile Perrot Sud Wharf, and Ile Perrot Nord Wharf. Also, a statement of the amounts paid to different persons, companies, etc., for such work, the dates, etc., and a copy of the estimates already brought down at my request, the whole since 1904. Presented April 30, 1917.—*Mr. Boyer*.. .. ..*Not printed.*

123*a*. Return to an Order of the House of the 16th February, 1916, for a copy of all letters, petitions, correspondence, telegrams and reports exchanged between the Government, the resident engineer of the district, and all other persons, concerning the dredging work done at the places below named, and the amount of money paid to divers, persons companies, etc., for such work, as well as the statements already presented at any request, the whole since 1904:—At the wharf of Ile Perrot, North, South and at the Church; in Dorion Bay channel; at Vaudreuil Village channel; at Pointe Cavagnal; at Como; at Hudson; at Hudson Heights channel; at Graham channel; in the Rigaud River channel; in the Ottawa river; Ile aux Poires channel; at Pointe Fortune, and at Ste-Anne de Bellevue channel. Presented April 30, 1917.—*Mr. Boyer*.. .. ..*Not printed.*

124. Return to an Order of the House of the 3rd May, 1916, for a copy of all letters, telegrams, bills, vouchers and memoranda in connection with the repairs to the wharf at Upper Prospect, Halifax County, N.S., in 1915. Presented April 30, 1917.—*Mr. McLean (Halifax)*.. .. ..*Not printed.*

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125. Return to an Order of the House of the 3rd May, 1916, for a copy of all letters, telegrams, bills, vouchers and memoranda in connection with the repairs to the wharf at Shad Bay, Halifax County, N.S., in 1915. Presented April 30, 1917.—*Mr. McLean (Halifax)*.. .. .. .

CONTENTS OF VOLUME 21—*Continued.*

136. Return to an Order of the House of the 23rd April, 1917, for a return showing:—1. The names, former post office addresses, occupations and salaries paid to the censors and decoders in the employ of the Government at Hazel Hill and Canso during the year 1916. 2. How much has been expended in connection with this service at Canso and Hazel Hill since the first of August, 1914, up to the present date. 3. How much has been expended in connection with the said service in embracing all the stations in the province of Nova Scotia from August 1, 1914, up to the present date. Presented May 2, 1917.—*Mr. Sinclair*.. .. ..*Not printed.*

137. Return to an Order of the House of the 23rd April, 1917, for a copy of all contracts and agreements between Sir Charles Ross, his successors or assigns, and His Majesty the King, represented by the Minister of Militia and Defence, since and including the agreement between them dated the 27th day of March, A.D., 1902. Presented May 2, 1917. *Mr. Northrup*.. .. ..*Printed for Sessional Papers only.*

138. Return to an Order of the House of the 23rd April, 1917, for a return showing:—1. How many permanent civil servants or officials were in the employ of the Department of Militia and Defence on the 10th day of October, 1911, and how many on the 31st of March, 1917. 2. How many temporary civil servants and employees of all kinds were in the employ of the said Department on the 10th day of October, 1911, and how many on the 31st of March, 1917. 3. How many permanent civil servants or officials were appointed by said Department since the 1st of August, 1914. 4. How many temporary civil servants and employees were employed by said Department since August 1, 1914. 5. What was the gross amount paid by said Department for salaries and expenses to both permanent and temporary civil servants and employees for the fiscal year ending March 31, 1914. 6. What was the gross amount paid by said Department for salaries and expenses of all permanent and temporary civil servants and employees for the fiscal year ending March 31, 1917. 7. How many civil servants were appointed by said Department since October 10, 1911, under the provisions of Section 21 of the Civil Service Act. Presented May 2, 1917.—*Mr. Macdonald*.. .. ..*Not printed.*

138*a*. Return to an Order of the House of the 2nd May, 1917, for a return showing:—1. How many permanent civil servants or officials were in the employ of the Department of Naval Affairs on the 10th day of October, 1911, and how many on the 31st of March, 1917. 2. How many temporary civil servants and employees of all kinds were in the employ of the said Department on the 10th day of October, 1911, and how many on the 31st of March, 1917. 3. How many permanent civil servants or officials were appointed by said Department since the 1st of August, 1914. 4. How many temporary civil servants and employees were employed by said Department since August 1, 1914. 5. What was the gross amount paid by said Department for salaries and expenses to both permanent and temporary civil servants and employees for the fiscal year ending March 31, 1911. 6. What was the gross amount paid by said Department for salaries and expenses of all permanent and temporary civil servants and employees for the fiscal year ending March 31, 1917. 7. How many civil servants were appointed by said Department since October 10, 1911, under the provisions of Section 21 of the Civil Service Act. Presented May 16, 1917.—*Mr. Chisholm*.. .. ..*Not printed.*

138*b*. Return to an Order of the House of the 2nd May, 1917, for a return showing:—1. How many permanent civil servants or officials were in the employ of the Department of Marine and Fisheries on the 10th day of October, 1911, and how many on the 31st day of March, 1917. 2. How many temporary civil servants and employees of all kinds were in the employ of the said Department on the 10th day of October, 1911, and how many on the 31st of March, 1917. 3. How many permanent civil servants or officials were appointed by said Department since the 1st of August, 1914. 4. How many temporary civil servants and employees were employed by said Department since August 1, 1914, 5. What was the gross amount paid by said Department for salaries and expenses to both permanent and temporary civil servants and employees for the fiscal year ending March 31, 1911. 6. What was the gross amount paid by said Department for salaries and expenses of all

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permanent and temporary civil servants and employees for the fiscal year ending March 31, 1917. 7. How many civil servants were appointed by said Department since October 10, 1911, under the provisions of Section 21 of the Civil Service Act. Presented May 31, 1917.—*Mr. Sinclair*.. .. .. .

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by said Department since 1st of August, 1914. 4. How many temporary civil servants and employees were employed by said Department since August 1, 1914, 5. What was the gross amount paid by said Department for salaries and expenses to both permanent and temporary civil servants and employees for the fiscal year ending March 31, 1914. 6. What was the gross amount paid by said Department for salaries and expenses of all permanent and temporary civil servants and employees for the fiscal year ending March 31, 1917. 7. How many civil servants were appointed by said Department since October 10, 1911, under the provisions of Section 21 of the Civil Service Act. Presented by Hon. Mr. Roche, July 10, 1917.—*Mr. Kyte*.. .. ..*Not printed.*

138*g*. Return to an Order of the House of the 23rd April, 1917, for a return showing:—1. How many permanent civil servants or officials were in the employ of the Department of Agriculture on the 10th day of October, 1911, and how many on the 31st day of March, 1917. 2. How many temporary civil servants and employees of all kinds were in the employ of the said Department on the 10th day of October, 1911, and how many on the 31st of March, 1917. 3. How many permanent civil servants or officials were appointed by said Department since the 1st of August, 1914. 4. How many temporary civil servants and employees were employed by said Department since August 1, 1914, 5. What was the gross amount paid by said Department for salaries and expenses to both permanent and temporary civil servants and employees for the fiscal year ending March 31, 1914. 6. What was the gross amount paid by said Department for salaries and expenses of all permanent and temporary civil servants and employees for the fiscal year ending March 31, 1917. 7. How many civil servants were appointed by said Department since October 10, 1911, under the provisions of Section 21 of the Civil Service Act. Presented August 15, 1917.—*Mr. Hughes (P.E.I.)*.. .. ..*Not printed.*

138*h*. Return to an Order of the House of the 2nd May, 1917, for a return showing:—1. How many permanent civil servants or officials were in the employ of the Department of State and Mines on the 10th day of October, 1911, and how many on the 31st of March, 1917. 2. How many temporary civil servants and employees of all kinds were in the employ of the said Department on the 10th day of October, 1911, and how many on the 31st of March, 1917. 3. How many permanent civil servants or officials were appointed by said Department since the 1st of August, 1914. 4. How many temporary civil servants and employees were employed by said Department since August 1, 1914, 5. What was the gross amount paid by said Department for salaries and expenses to both permanent and temporary civil servants and employees for the fiscal year ending March 31, 1911. 6. What was the gross amount paid by said Department for salaries and expenses of all permanent and temporary civil servants and employees for the fiscal year ending March 31, 1917. 7. How many civil servants were appointed by said Department since October 10, 1911, under the provisions of Section 21 of the Civil Service Act. Presented August 21, 1917.—*Mr. McKenzie*.. .. ..*Not printed.*

139. Return to an address to His Excellency the Governor General of the 23rd April, 1917, for a copy of the Order in Council and all other papers in connection with the awarding of the contract to J. C. Shields and others, or to the Inland Express Company for carrying the mails from Ashcroft to Fort George, B.C. Presented May 2, 1917.—*Mr. Turriff*.. .. ..*Not printed.*

140. Return to an Address to His Excellency the Governor General of the 31st January, 1917, for a copy of all correspondence exchanged with the Governement of the Province of Manitoba concerning a statute passed by the Legislature of Manitoba at its last session, entitled, "An Act to amend the Jury Act"; together with copies of all Orders in Council respecting same. Presented May 3, 1917.—*Sir Wilfrid Laurier*.. *Not printed*

141. Return to an Order of the House of the 7th February, 1917, for a return showing:—1. The number of interned aliens, and nationality of each, employed on public works since the 4th August, 1914. 2. The number employed in industrial work in the provinces of Canada, and the nationality of each, since the 1st of August, 1914. 3. The number so employed at the present time. Presented May 3, 1917.—*Mr. Kyte*.. .. .. ..*Not printed.*

CONTENTS OF VOLUME 21—*Continued.*

142. Return to an Order of the House of the 2nd May, 1917, for a copy of the report of the Royal Commission appointed by Order in Council, 20th September, 1916, to inquire into and report upon the conditions in regard to the delivery of cargoes of coal to coasting vessels in the Maritime Provinces. Presented May 7, 1917.—*Mr. Hughes (Kings, P.E.I.)*.. .. ..*Not printed.*

143. Return to an Order of the House of the 31st January, 1917, for a return showing:—1. How many applicants for enlistment in the Canadian Overseas Forces have been rejected on account of being physically unfit. 2. How many have been discharged after enlistment for the same reason. Presented May 7, 1917.—*Mr. Steele*.. ..*Not printed.*

143*a*. Return to an Order of the House of the 30th April, 1917, for a return showing:—1. How many Americans have enrolled in Canadian Regiments since the commencement of the war. 2. How many natives of the British Isles are so enrolled in Canada since the 1st of August, 1914. Presented July 31, 1917.—*Mr. Boulay*.. .. ..*Not printed.*

143*b*. Return to an Order of the House of the 31st January, 1917, for a return showing:—1. How many men have enlisted in Canada for overseas service. 2. How many of these have been subsequently discharged as unfit. 3. How many of these were discharged in Canada, and how many overseas. Presented May 7, 1917.—*Mr. Graham*..*Not printed.*

143*c*. Return to an Order of the House of the 14th May, 1917, for a return showing:—1. Whether the Minister of Militia or any of the authorities of the Militia Department has official statistics as to the recruiting of soldiers in Canada for overseas service. 2. If so, what the correct figures are of enlistments in the different overseas regiments raised since August, 1914, to date (*a*) Canadian speaking the French language; (*b*) Canadians speaking the English language and born in Canada; (*c*) British subjects by birth born outside of Canada; (*d*) British subjects by naturalization; (*c*) British subjects by birth born outside of Canada; (*d*) British subjects by naturalization; (*e*) French Canadian soldiers in regiments commanded by officers speaking the English language raised in the province of Quebec; and (*f*) French Canadian soldiers in battalions raised in the other provinces of Canada. Presented June 14, 1917.—*Mr. Lanctôt*.. .. ..*Not printed.*

143*d*. Copy of Census Statistics showing Summary of Strength of all Units of the Canadian Expeditionary Forces in England, period 14th May, 1917, together with statement showing number of Canadian troops in France, England, in the Near East, St. Lucia and in Canada, June, 1917. Presented by Sir Edward Kemp, June 15, 1917.. ..*Not printed.*

144. P.C. 2314, dated 7th October, 1916, appointing a Special Seed Commissioner and three assistants, with authority to purchase seed wheat to fill requisitions for seed from municipal governing bodies in districts that have suffered crop failure due to the prevalence of rust and frost. Also, P.C. 3073, dated 14th December, 1916, authorizing the Special Seed Commission to purchase seed oats and seed barley to fill requisitions for seed from municipal governing bodies and farmers' organizations in districts where there is no supply. Presented by Hon. Mr. Burrell, May 8, 1917.. .. .. ..*Not printed.*

145. Return to an Order of the House of the 1st February, 1917, for a copy of all communications, reports and documents concerning the alleged treatment of Thos. Kelly, a prisoner in the Stony Mountain Penitentiary. Presented May 9, 1917.—*Mr. Buchanan.*
Not printed.

146. Copy of Order in Council, P.C. 1183, dated 28th April, 1917, authorizing the granting, at the request of His Majesty's Government in England, of a further 300 miles of rails for use in France in connection with the war. Presented by Hon. Mr. Meighen, May 10, 1917.. .. ..*Not printed.*

146*a*. Return to an Order of the House of the 13th June, 1917, for a return showing:—1. Between what points on the Canadian Northern Railway Line west of Edmonton the rails are to be taken up to be placed on the Grand Trunk Pacific Line. 2. Between what points on the Grand Trunk Pacific Line west of Edmonton the rails of the Grand Trunk are to be replaced by rails of the Canadian Northern Railway. Presented June 14, 1917.—*Mr. Oliver*.. .. ..*Not printed.*

CONTENTS OF VOLUME 21—*Continued.*

146b. Tabulated statement showing list of points on the Eastern Division of the National Transcontinental Railway from which rails were lifted for shipment overseas to France, mileage lifted at each point and replaced with rails from Intercolonial Railway (together with a map accompanying same). Presented by Hon. Mr. Cochrane, June 21, 1917.. .. ..*Not printed.*

147. Return called for by Section 88, of Chapter 62, Revised Statutes of Canada, requiring that the Minister of the Interior shall lay before Parliament, each year, a return of liquor brought from any place out of Canada into the Territories by special permission in writing of the Commissioner of the Northwest Territories, for the year ending 31st December, 1916. Presented by Hon. Mr. Roche, May 11, 1917.. .. ..*Not printed.*

148. Return to an Address to His Excellency the Governor General of the 30th April, 1917, for a copy of the application for Arbitration Boards made to the Labour Department by the Provincial Workman's Association or its officers and the United Mines Workmen of Nova Scotia or its officers. Also a copy of all letters, copies of letters and other documents relating to this matter, along with all letters, papers, other documents and Orders in Council relative to the appointment of a Commission to investigate labour and other conditions in the County of Cape Breton. Presented May 11, 1917.—*Mr. Kyte*.. .. ..*Not printed.*

149. Return to an Order of the House of the 2nd May, 1917, for a copy of all letters, copies of letters, telegrams, reports and all other documents relative to the purchase of the two vessels, *A. J. McKee* and *T. J. Drummonds*, by the Railway Department under the Order in Council dated April 17, 1917. Presented May 14, 1917.—*Mr. Macdonald.*
Not printed.

150. Return to an Order of the House of the 31st January, 1917, for a copy of all correspondence, telegrams, memoranda, etc., by and with the Department of Railways in connection with the naming of stations on the Halifax and Eastern Railway. Presented May 14, 1917.—*Mr. Maclean (Halifax)*.. .. ..*Not printed.*

151. Return to an Order of the House of the 23rd April, 1917, for a copy of all statements, reports, evidence, letters and other papers and documents in the possession of the Department of Railways and Canals relating to a claim for a horse belonging to one Dan McFarlane, injured at Brinley Brook, N.S., by the Canadian Government Railway. Presented May 15, 1917.—*Mr. Sinclair*.. .. ..*Not printed.*

152. Return to an Order of the House of the 25th April, 1917, for a copy of all documents, papers, correspondence and reports concerning the suspension of Polydore Lebel, engineer on the Intercolonial Railway at Rivière du Loup, as a result of a wreck in the year 1916. Presented May 15, 1917.—*Mr. Lapointe (Kamouraska)*.. .. .. ..*Not printed.*

153. Return to an Order of the House, of the 31st January, 1917, for a copy of all letters, telegrams and other documents relative to the removal of Mr. Spenny as Trackmaster on the Short Line, so-called, of the Canadian Government Railway, and to the appointment of Henry Gray as his successor. Presented May 15, 1917.—*Mr. Macdonald.*
Not printed.

154. Return to an Address to His Royal Highness the Governor General, of the 7th February, 1916, for a copy of all papers in connection with the appointment of Léon Roy as interpreter in the Department of the Interior; and also a copy of the Order in Council, documents and correspondence relating to his dismissal. Presented May 16, 1917.—*Sir Wilfrid Laurier*.. .. ..*Not printed.*

155. Return to an Order of the House, of the 30th April, 1917, for a copy of all letters, papers, telegrams and other documents relative to the establishment of the Canadian Government *Railway Employees Magazine*, showing the circulation thereof, the cost of production, receipts, and the persons employed in connection therewith, giving a statement of the amount received by said persons from the Railway in any capacity. Presented May 21, 1917.—*Mr. Macdonald*.. .. ..*Not printed.*

CONTENTS OF VOLUME 21—*Continued.*

156. Return to an Order of the House, of the 22nd March, 1916, for a Return showing:—1. The number of conductors, brakemen, drivers and firemen, respectively, who were on duty on the Canadian Government Railways between Moncton and Campbellton during the month of February, 1916. 2. The number of hours each of the above mentioned trainmen and enginemen were on duty each trip between said points during said month of February, 1916. Presented May 21, 1917.—*Mr. Copp*.. .. ..*Not printed.*

157. Report of Exchequer Court proceedings under Section 49A of the Indian Act, in respect to the removal of the Indians from Sydney Reserve, Nova Scotia. Presented by Hon. Mr. Roche, May 22, 1917.. .. ..*Not printed.*

158. Report of the work of the Military Hospitals Commission from its inception to the present date. Presented by Sir Robert Borden, May 23, 1917. .. ..*Not printed.*

159. Copy of correspondence between Members of the Government and the Canadian Manufacturers Association respecting the purchase of supplies for the Canadian Expeditionary Forces in England and at the Front. Presented by Sir Robert Borden, May 23, 1917.. .. ..*Not printed.*

160. Return to an Order of the House, of the 14th May, 1917, for a copy of the correspondence between the Prime Minister and the ex-Minister of Militia and Defence, which led to the latter's resignation or dismissal from the Government. Presented by Sir Robert Borden, May 23, 1917.—*Mr. Hughes (King's, P.E.I.)*.. .. ..*Not printed.*

161. Return to an humble Address of the Senate to His Excellency the Governor General, dated the 26th day of January, 1917, for a statement showing the date and object of all commissions instituted by the Government of the day, since its accession to power in 1911, up to the present date; the number of days during which each of these commissions sat, giving the names of the individuals who formed part of such commissions, and what was the cost of each to the country. *(Senate.)*.. .. ..*Not printed.*

161*a*. Part Return to an humble Address of the Senate, dated the 7th day of February, 1917, to His Excellency the Governor General, for:—A statement showing the date, the object and the personnel of all commissions instituted by the late Government from its accession to power in 1896, up to the accession to power of the present Government in 1911, the number of days during which each of these commissions set, and what was the cost of each to the country. *(Senate.)*.. .. ..*Not printed*

162. Order in Council P.C. 1433, dated 24th May, 1917, containing regulations concerning the departure out of Canada of male persons who are liable to or capable of national service of a military or other charaoter. Presented by Hon. Mr. Roche, May 29, 1917. *Not printed.*

163. Return to an Address to His Excellency the Governor General, of the 23rd May, 1917, for a copy of the Order in Council, if any, providing that preference in appointments to the Civil Service should be given to returned soldiers. Presented May 29, 1917.—*Mr. Boulay*.. .. ..*Not printed.*

164. Return to an Order of the House, of the 3rd February, 1917, for a copy of all reports findings, evidence, memoranda, etc., in connection with the inquiry into the damages sustained by H.M.C.S. *Grilse* en route from Halifax to Bermuda. Presented May 30, 1917.—*Mr. Maclean (Halifax.)*.. .. ..*Not printed.*

165. Return to an Order of the House, of the 14th May, 1917, for a copy of all letters, petitions, correspondence, telegrams and reports in any way referring to the dismissal or retirement of D. McDermid, Superintendent of Fish Hatchery at East Margaree, and the appointment of his successor. Presented May 30, 1917.—*Mr. Chisholm.* *Not printed.*

166. Return to an Order of the House, of the 25th April, 1917, for a copy of all letters, telegrams, reports and other papers and documents relative to the application of Willis Keizer of Hall's Harbour, King's County, N.S., for a license to operate a fishing weir at Square Cove, King's County, N.S. Presented May 30, 1917.—*Mr. Maclean (Halifax.)* *Not printed.*

CONTENTS OF VOLUME 21—*Continued.*

167. Return to an Address to His Excellency the Governor General, of the 23rd April, 1917, for a copy of all correspondence, memoranda, Orders in Council, etc., in reference to the dismissal of Moses H. Nickerson, as Inspector of Life-saving Stations in Nova Scotia Presented May 30, 1917.—*Mr. Maclean (Halifax)*.. .. ..*Not printed.*

168. Copies of Pension Regulations with amendments and as amended to February 28, 1917, with copies of Orders in Council relating thereto. Presented by Sir Thomas White, May 30, 1917.. .. ..*Printed for sessional papers only.*

168*a*. Copy of Order in Council, P.C. 277, dated 30th January, 1917, regarding pensions of officers or their dependants in respect of the exchange of officers between the Government of Canada and the Imperial Government. Presented by Sir Edward Kemp, August 20, 1917.. .. ..*Not printed.*

169. Return to an Order of the House, of the 14th May, 1917, for a copy of all letters, correspondence, petitions, telegrams and reports between the Minister of Marine and Fisheries and any person or persons in any way referring to the removal of the salmon nets on that portion of the coast of Inverness extending east and west from the mouth of the Margaree River. Presented May 31, 1917.—*Mr. Chisholm*.. .. ..*Not printed.*

170. Return to an Order of the House, of the 2nd May, 1917, for a copy of the report of the Commission appointed to investigate the condition of the Military Hospital at Halfax, with a copy of the evidence taken by said Commission at Halifax and all other documents in the possession of the Department of Militia and Defence in connection with such investigation. Presented May 31, 1917.—*Mr. Sinclair*.. .. .. ..*Not printed.*

171. Return to an Order of the House, of the 7th May, 1917, for a return showing the amount paid or spent by the Department of Militia in advertising for recruits in Canada, showing the persons, firms and corporations to whom the payments were made, up to April 1, 1917. Presented May 31, 1917.—*Mr. Macdonald*.. .. ..*Not printed.*

172. Finding of the Court of Inquiry appointed by the Adjutant-General by Orders dated the 1st May, 1917, for the purpose of collecting and recording evidence in connection with the allegations contained in several newspapers that Troop Trains had been stoned passing through Rivière-du-Loup, Quebec, and other places, and for the purpose of collecting and recording any other evidence which, in the opinion of the Members of the Court, in any way relates to or has a bearing on this matter. Presented by Sir Edward Kemp, May 31, 1917.. .. ..*Not printed.*

173. Finding of the Court of Inquiry appointed by the Adjustant-General by Orders dated the 1st May, 1917, for the purpose of collecting and recording evidence in connection with the allegations contained in several newspapers accusing the citizens of Quebec of maltreating or allowing to be maltreated, soldiers returning from the War and passing through or sojourning in Quebec, and for the purpose of collecting and recording any other evidence which, in the opinion of the Members of the Court, in any way relates to or has a bearing on the matter. Presented by Sir Edward Kemp, May 31, 1917.. .. ..*Not printed.*

174. Return to an Order of the House, of the 7th May, 1917, for a copy of all accounts, letters, claims, correspondence and other documents relating to the following amounts mentioned in the Report of the Auditor General 1916, Vol. 11, page L—11:—Mr. Justice L. P. Pelletier, travelling expenses, $877; Mr. Justice I. N. Belleau, travelling expenses, $1,984.44; Mr. Justice T. H. Chauvin, travelling expenses, $1,421.25; Mr. Justice B. LeTellier, travelling expenses, $1,923.80. Presented May 31, 1917.—*Mr. Lanctot*.. .. ..*Not printed.*

175. Return to an Order of the House, of the 30th May, 1917, for a Return showing:—1. The number of persons appointed to permanent position on the Canadian Government Railways from January 1, 1916, to March 31, 1917, who were not previously employed on the said Railways. 2. Their names, salaries and the positions to which they were appointed. Presented May 31, 1917.—*Mr. Copp*.. .. ..*Not printed.*

CONTENTS OF VOLUME 21—*Continued.*

176. Return to an Order of the House, of the 12th February, 1915, for a Return showing how many persons of German nationality are employed in the several Departments of the Federal Government, in what capacity and the salaries received respectively. Presented June 1, 1917.—*Mr. Delisle*.. .. ..*Not printed.*

177. Return to an Order of the House, of the 1st May, 1916, for a copy of all correspondence and papers relating to the change in the location of the post office at Roseberg, Alberta. Presented June 1, 1917.—*Mr. Buchanan*.. .. ..*Not printed.*

178. Return to an Order of the House, of the 8th May, 1916, for a copy of all correspondence, letters and telegrams relating to the dismissal of Augustin D. Lauteigne as Postmaster of Island River, Gloucester County, N.B. Presented June 1, 1917.—*Mr. Turgeon.* *Not printed.*

179. Return to an Order of the House, of the 31st January, 1917, for a copy of all letters and telegrams in the Post Office Department in reference to the removal of Pearson's Post Office, Township of Casey, in the Constituency of Nipissing, from where it was located to its present location. Presented June 1, 1917.—*Mr. Turriff*.. ..*Not printed.*

180. Return to an Order of the House, of the 5th February, 1917, for a copy of all letters, reports, papers and other documents relative to the dismissal of John R. McIntosh as Postmaster of Cummings Mountain, Pictou County, and the appointment of James Cummings as his successor. Presented June 1, 1917.—*Mr. Macdonald*.. ..*Not printed.*

181. Return to an Order of the House, of the 2nd May, 1917, for a Return showing:—The gross amount paid by the Government since October, 1911, to H. P. Duchemin, of Sydney, N.B., for services and disbursements under the Public Inquiries Act, or otherwise. Presented June 1, 1917.—*Mr. Sinclair*.. .. ..*Not printed.*

182. Return to an Order of the House, of the 3rd February, 1917, for a copy of all correspondence, letters, telegrams and other documents concerning the cancelling by the Post Office Department of the rural mail contract granted to Hyppolite Lambert of St. Antoine, in the County of Lotbinière, Que. Presented June 1, 1917.—*Mr. Fortier.* *Not printed.*

183. Reports, pursuant to a Resolution of the House adopted on the 18th May, 1916, based on a recommendation of the Joint Committee of both Houses on Printing of Parliament, requesting information from the several Departments of Government with the view to effecting all possible economy in the matter of public printing and the distribution of public documents, and the extent, if any, to which such recommendations have been carried into effect. Presented by Hon. Mr. Patenaude, June 1, 1917.. ..*Not printed.*

184. Return to an Order of the House, of 21st May, 1917, for a copy of all correspondence, reports and recommendations, if any, from the Grain Commission to the Department of Trade and Commerce or any other Department of the Government at Ottawa, following a meeting of the Grain Commissioners held in Lethbridge this year. Presented June 1, 1917.—*Mr. Buchanan*.. .. ..*Not printed.*

185. Order in Council passed in conformity with provisions of 4-5 George V., Chapter 20, S-15 (C. N. Railway.)—(*The Senate*).. .. ..*Not printed.*

186. Return to an Order of the House, of the 3rd February, 1917, for a return showing the quantity and value of exports in following commodities for the first nine months of present fiscal year:—Horses; brass and manufacturers of same; wheat, breadstuffs; oats and grain other than wheat; automobiles, bicycles, motorcycles and parts of same, including engines and tires; railway cars and parts; chemicals; copper and manufactures of same; cotton manufactures; explosives; iron and steel and manufactures of same; firearms and munitions; leather and manufactures of same; meat and dairy products; alcohol; vegetables, dried and canned; lead; wearing apparel of all kinds; zinc and manufactures of same; paper and manufactures of same. Presented June 4, 1917.—*Mr. Maclean (Halifax)*... .. ..*Printed for sessional papers only.*

CONTENTS OF VOLUME 21—*Continued.*

187. Return to an Order of the House, of the 30th April, 1917, for a copy of all documents, correspondence, letters, telegrams, memoranda and reports exchanged between the Sergeant-at-Arms of the House of Commons and the Honourable Albert Sévigny; the Sergeant-at-Arms and the Justice Department, and between the Department of Justice and the Honourable Albert Sévigny, concerning certain effects, furniture and ornaments connected with the Speaker's Apartments. Also, copy of all accounts, receipts, bills of lading and transportation accounts concerning the said effects, furniture and ornaments. Presented June 5, 1917.—*Mr. Lanctot*.. .. ..*Not printed.*

188. Copy of Order in Council P.C. 1457, dated the 29th May, 1917, respecting pay to members of the Civil Service who join the Military forces of Canada either by voluntary enlistment or otherwise from and after the date hereof. Presented by Sir Thomas White, June 6, 1917... .. ..*Not printed.*

189. Copy of General Reports of W. F. O'Connor, K.C., Acting Commissioner *re* Cost of Living, concerning the production, cost, selling prices, and distribution system of refined sugar. Presented by Hon. Mr. Crothers, June 6, 1917

Printed for distribution and sessional papers.

190. Copy of Reports of W. F. O'Connor, on the subject of the Anthracite Coal business in Canada. Presented by Hon. Mr. Crothers, June 6, 1917.

Printed for distribution and sessional papers.

191. Return to an humble Address of the Senate to His Excellency the Governor General, dated the 22nd of May last, showing a copy of:—All correspondence exchanged between the Government or its Ministers, the Minister of Militia, the Militia Council, Major-General F. L. Lessard, C.B., Inspector-General, or any other person, and Lieutenant-Colonel Armand Lavergne, O.C., the 61st Regiment or any other person, on the subject of the territorial defence of the Province of Quebec, as well as copy of all Orders in Council or documents relating to this subject.—(*Senate*).. .. ..*Not printed.*

192. Copy of Order in Council, P.C. 1579, dated 8th June, 1917, appointing a Fuel Controller for Canada. Presented by Sir George Foster, May 12, 1917.

Printed for sessional papers only.

192*a*. Copy of Order in Council, P.C. 1460, dated 16th June, 1917, *re* the appointment of an Officer to be known as Food Controller for Canada, and specifying his powers and duties. Presented by Sir Robert Borden, June 19, 1917.

Printed for sessional papers only.

193. Copy of Order in Council, P.C. 1604, dated 11th June, *re* the establishment of "The Board of Grain Supervisors of Canada." And also, Copy of Order in Council, P.C. 1605, dated 11th June, 1917, appointing certain persons as members of "The Board of Grain Supervisors of Canada." Presented by Sir George Foster, May 12, 1917.

Printed for sessional papers only.

194. Copies of Census Statistics of male population of Canada, Census of 1911, between the ages of 20 and 45, both years inclusive, according to conjugal condition and nativity. Presented by Sir Edward Kemp, June 13, 1917.

Printed for sessional papers only.

195. Copies of The King's Regulations and Orders for the Army, 1912, re-printed with amendments published in Army Orders up to 1st August, 1914. Presented by Sir Edward Kemp, June 13, 1917... .. ..*Not printed.*

196. Copies of Manual of Military Law, War Office, 1914. Presented Sir Edward Kemp, June 13, 1917.. .. ..*Not printed.*

197. Copy of Order in Council, P.C. 987, dated 10th April, 1917, as amended by Order in Council No. 1451, dated 25th May, 1917: Regulations, being as Consolidation of and additions to various Orders in Council made in consequence of the War, the whole to be known as the "Defence of Canada Order, 1917." Presented by Hon. Mr. Hazen, June 13, 1917... .. ..*Not printed.*

CONTENTS OF VOLUME 21—*Continued.*

198. Return to an Order of the House, of the 14th May, 1917, for a copy of all letters, petitions, correspondence, telegrams and reports in any way referring to dismissal, retirement or resignation of John McDonald, as Janitor of public building at Inverness, and the appointment of his successor. Presented June 15, 1917.—*Mr. Chisholm. Not printed.*

199. Return to an Order of the House, of the 14th May, 1917, for a copy of all letters, petitions, correspondence, telegrams and reports received by the Government since September, 1911, to the present day, in any way referring to the extension and repairs to McKay's Point Wharf, Inverness County. Presented June 15, 1917.—*Mr. Chisholm*.. .. ..*Not printed.*

200. Return to an Order of the House, of the 7th May, 1917, for a copy of the replies which the Government or the Department of Public Works sent to the Resident Engineer or other parties in answer to letters, telegrams, or reports in connection with the breakwater at Souris, P.E.I., during the years 1915 and 1916. Presented June 15, 1917.—*Mr. Hughes (King's, P.E.I.)*.. .. ..*Not printed.*

201. Return to an Order of the House, of the 23rd May, 1917, for a copy of all correspondence, telegrams, recommendations and other communications relating to the dismissal of Hector Urquhart, as lineman on the Dominion Government telegraph line between Grand River and Enon, Cape Breton County, Nova Scotia, and relating to the appointment of Dan. A. McLennan to said position. Presented June 15, 1917.—*Mr. Kyte*.. .. ..*Not printed.*

202. Return to an Order of the House, of the 14th May, 1917, for a copy of all letters, petitions, correspondence, telegrams and reports received by the Government since September, 1911, to the present day, in any way referring to the extension and repairs to Craignish Wharf. Presented June 15, 1917.—*Mr. Chisholm*..*Not printed.*

203. Return to an Order of the House, of the 3rd May, 1917, for a Return showing:—1. The amount which has been paid for stenographic reporting for the different Commissions or inquiries which have been held by the Government since November, 1911, to the present time. 2. The names of the persons to whom these amounts have been paid for stenography and the respective amounts paid to each of them. Presented June 15, 1917.—*Mr. Verville*.. .. ..*Not printed.*

203*a*. Return to an Order of the House, of the 3rd May, 1917, for a Return showing:—1. The amount which has been paid for stenographic reporting for the different Commissions or inquiries which have been held by the Government since November, 1911, to the present time. 2. The names of the persons to whom these amounts have been paid for stenography and the respective amounts paid to each of them. Presented June 28, 1917.—*Mr. Verville*.. .. ..*Not printed.*

204. Return to an Address to His Excellency the Governor General, of the 9th May, 1917, for a copy of all papers, petitions, telegrams and all other documents sent to the Government urging upon them the necessity of abolishing the wet canteen system in the camps overseas. Presented June 15, 1917.—*Mr. Lemieux*.. .. .. ..*Not printed*

205. Copies of all correspondence, memoranda or other documents received by or sent by the Right Honourable the Prime Minister and the Honourable the Minister of Trade and Commerce, concerning a project to advertise Canadian products by the organization of an exhibition train of sample goods in France. (*Senate*)... .. .. ..*Not printed.*

205*a*. Supplementary Return to an Order of the Senate, dated the 7th June last, for a Return showing:—Copies of all correspondence, memoranda or other documents received by or sent by the Right Honourable the Prime Minister and the Honourable the Minister of Trade and Commerce, concerning a project to advertise Canadian products by the organization of an exhibition train of sample goods in France. *The Senate*.. .. ..*Not printed.*

CONTENTS OF VOLUME 21—*Continued.*

206. Letter of the Honourable E. L. Patenaude, M.P., to the Right Honourable the Prime Minister, resigning his position as Secretary of State for Canada, and the letter of the Prime Minister in acknowledgment thereof. Presented by Sir Robert Borden, June 18, 1917.. .. ..*Not printed.*

207. Return to an Order of the House, of the 3rd May, 1917, for a Return showing:—1. How much merchandise has been exported from Canada into Foreign Countries since the first of August, 1914, to the present time? 2. How much of these goods have gone through the Port of Hamburg? 3. What countries have imported this merchandise from Canada, and the respective amounts for each of them? Presented June 18, 1917.—*Mr. Verville*.. .. ..*Not printed.*

208. Return to an Order of the House, of the 3rd February, 1916, for a return showing the itemized disbursements of Ward Fisher, Inspector of Fisheries for Western Nova Scotia, for the year 1912, amounting to $388.40, and the year 1913, amounting to $1,009.84. Presented June 18, 1917.—*Mr. Law*.. .. ..*Not printed.*

209. Return to an Order of the House, of the 23rd April, 1917, for a copy of all papers, documents, petitions, memoranda, correspondence, etc., with the Government of British Columbia or any member thereof with the Fishery Officers of the Marine and Fisheries Department resident in said Province, and with any Company, person or persons relating to prohibition of the export of British Columbia salmon since January 20, 1913. Presented June 18, 1917.—*Mr. McKenzie*.. .. ..*Not printed.*

210. Statement of Amount and Price of Commodities purchased and sold (including export and home consumption) by Cold Storage Companies in Canada from January 1 to December 1, 1916. Presented by Hon. Mr. Crothers, June 18, 1917.. .. .. ..*Not printed.*

210*a*. Report of W. F. O'Connor, K.C., Acting Commissioner *re* Cost of Living, concerning Cold Storage Conditions in Canada. Presented by Hon. Mr. Crothers, July 13, 1917. *Printed for distribution and sessional papers.*

210*b*. Copy of Order in Council, P.C. 2021, dated 23rd July, 1917, recommending the further investigation into the premises, books, papers and records of the William Davies Company, Limited, and Matthews-Blackwell, Ltd., as disclosed by the report of W. F. O'Connor, Acting Commissioner on the Cost of Living, on the subject of cold storage conditions in Canada, and appointing G. F. Henderson, A. B. Brodie and Geoffrey Clarkson with all the powers of Examiners under Part I of the Inquiries Act to inquire into the books, papers, etc., of the said companies; also to recommend in writing to the Minister of Labour a standardized system of costs accounting applicable to the cold storage business by which the net profits of cold storage companies in Canada may from time to time be readily ascertained. Presented by Hon. Mr. Crothers, July 25, 1917.. .. ..*Not printed*

211. Return to an Order of the House, of the 11th June, 1917, for a copy of all correspondence, telegrams, requests, petitions and other papers in the possession of the Department of Trade and Commerce relating to providing a supply of salt for the fisheries of the Maritime Provinces. Presented by Sir George Foster, June 22, 1917. *Not printed.*

212. Copy of Order in Council, P.C. No. 1725, dated the 25th June, 1917, creating the position of Director of Coal Operations for the southeastern coal fields of the Province of British Columbia and the suthwestern coal fields of the Province of Alberta, known as District 18. And also.—Copy of Order in Council, P.C. No. 1726, dated the 25th June, 1917, appointing W. H. Armstrong, of the City of Vancouver, Director of Coal Operations under the provisions of the above Order in Council, P.C. No. 1725, dated 25th June, 1917. Presented by Sir Robert Borden, June 25, 1917... ..*Not printed.*

212*a*. Return to an Order of the House, of the 14th May, 1917, for a copy of all letters, reports, communications and documents passing between the Minister of Labour and the Department of Labour and the officials of District No. 18, United Mine Workers

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of Alberta, and the officials of the Alberta and Eastern British Columbia Coal Operators' Association, concerning the requests made by the Miners for an increase in wages due to the increase in the cost of living, between September 1, 1916, and the present time. Presented July 12, 1917.—*Mr. Buchanan*.. .. ..*Not printed.*

213. Return to an Order of the House, of the 13th June, 1917, for a Return showing:—1. How many battalions of infantry left Canada with the First Contingent? 2. The number, and the designations of the different units of artillery which left with the First Contingent? 3. The number and the designation of the different medical corps which left Canada with the First Contingent? 4. The number and the designation of all the other units which left with the First Contingent? 5. The names, rank and duties of the supernumerary officers who left with the First Contingent. Presented June 26, 1917.—*Mr. Lachance*.. .. ..*Not printed.*

214. Return to an Address to His Excellency the Governor General, of the 30th May, 1917, for a copy of all correspondence, letters, cables and other documents exchanged between the Imperial Government or any of its members or officials with the Canadian Government or any of its members or officials, relative to the question of the proposed legislation by the Imperial Parliament to validate certain Acts and proceedings of the Legislature of British Columbia. Presented June 27, 1917.—*Mr. Macdonald*.. .. ..*Not printed.*

215. Return to an Order of the House, of the 4th June, 1917, for a copy of all correspondence between the Chief of the *Hansard* Translation Staff of the House, the Clerk of the House and the Speaker, since April 19, 1917, to date. Presented June 28, 1917.—*Mr. Lemieux*.. .. ..*Not printed.*

216. Return to an Order of the House, of the 27th March, 1916, for a return showing the amounts paid by the Federal Government from the 1st July, 1896, to the 1st October, 1911, to the following newspapers: Le *Canada*, *La Presse*, *La Patrie*, *Le Pays*, of Montreal, *La Vigie* and *Le Soleil*, of Quebec. Presented June 28, 1917.—*Mr. Boulay*.. .. ..*Not printed.*

217. Return to an Order of the House, of the 3rd May, 1917, for a Return showing the number of employees of the following Departments after 1896, and after 1911, respectively, viz.:—Inland Revenue, Interior, Public Works, Marine and Fisheries, Militia and Defence, Labour and Department of Trade and Commerce. Presented June 28, 1917.—*Mr. Boulay*.. .. ..*Not printed.*

218. Return to an Order of the House, of the 7th May, 1917, for a Return showing the number of returned soldiers who have been given employment in the various departments of the Government. Presented June 28, 1917.—*Mr. Lemieux*.. ..*Not printed.*

219. Return to an Order of the House, of the 25th June, 1917, for a copy of the reports made by the Penitentiary Surgeons in connection with the release from Penitentiary of Edward Levi Baugh. Presented July 4, 1917.—*Mr. Murphy*.. .. ..*Not printed.*

220. Return to an Order of the House, of the 21st May, 1917, for a return giving the names and salaries of employees of the Interior and Indian Departments, (*a*) Inside Service and (*b*) Outside Service, who volunteered for overseas service, and who were paid their full civil salary in addition to their military pay and allowances.

Those who volunteered for overseas service and who were paid a sufficient portion of their civil salary in addition to their military pay and allowances to bring their pay up to the amount of their civil salary.

Those who volunteered for overseas service and who received consideration (stating consideration) on account of their civil employment in addition to their military pay and allowances.

Those who volunteered for overseas service and who do not receive any consideration on account of their civil employment in addition to their military pay and allowances. Presented July 5, 1917.—*Mr. Oliver*.. .. ..*Not printed.*

CONTENTS OF VOLUME 21—*Continued.*

221. Report of Special Trade Commission to Great Britain, France and Italy, May-September, 1916. Presented by Sir George Foster, July 5, 1917... ..*Not printed.*

222. Return to an Order of the House, of the 13th June, 1917, for a Return showing:—1. The total expenditure connected with Agriculture by the Federal Government in each of the fiscal years from 1904-05 to 1916-17, inclusive. 2. How much money was set apart by the Agricultural Aid Act of 1912 to assist the Provincial Departments of Agriculture to improve and extend their work? 3. How much of above amount was given to each Province, and what was accomplished in each Province as a result of such assistance? 4. How much money was set apart by the Federal Government under the Agricultural Instructions Act of 1913, and under the provisions of the said Act what amounts were respectively allotted each year to the several Provinces? 5. What the general purpose of said Act is, and to what extent that purpose has been made effective in each Province. Presented July 5, 1917.—*Mr. Edwards.*
Printed for sessional papers only.

223. Return to an Order of the House, of the 11th June, 1917, for a Return showing:—1. Whether Mr. Giard, ex-M.P.P. for Compton, is an employee of the Government? 2. If so, since when? 3. The number of employees under his orders and their respective names? 4. What salary does said Giard receive? 5. The salary of each employee under his charge? 6. Whether he has bought, for the Government, any animals for breeding purposes? 7. If so, how many, and the price paid for each? 8. Where these animals were bought? 9. How many of them have been rejected or returned to the Government or to Mr. Giard? 10. If any have been refused or returned, why? 11. Where the said breeding animals are at present? 12. What the Government or the Department of Agriculture intends to do with the animals so refused and returned to Mr. Giard? Presented July 5, 1917.—*Mr. Gauvreau* *Not printed.*

224. Return to an Address to His Excellency the Governor General, of the 31st January, 1917, for a copy of all documents, letters, messages, correspondence, reports and particularly an Order in Council dated 6th December, 1898, respecting the exemption from military service of the Doukhobors. Presented by Hon. Mr. Roche, July 9, 1917. —*Mr. McCrancy*.. .. ..*Not printed.*

225. Return to an Address to His Excellency the Governor General, of the 31st January, 1917, for a copy of all Orders in Council and other documents on file in the Department of Marine and Fisheries relating to the requisitioning of Canadian ships by the Canadian Government. Presented July 11, 1917.—*Mr. Sinclair*.. .. ..*Not printed.*

226. Return to an Order of the House of the 7th June, 1917, for a return showing the number of recruiting officers which have been appointed in the province of Quebec, with the names, addresses, nature of functions and salaries of the same. Presented July 11, 1917.—*Mr. Carvell*.. .. ..*Not printed.*

226*a*. Return to an Order of the House of the 18th June, 1917, for a return showing:—1. The names and addresses of the parties on Prince Edward Island who have been engaged or who are now engaged in recruiting for the army and navy or doing other work of a like military character, since August, 1914. 2. The remuneration or pay each of the said parties receives and the allowance given for travelling or other expenses. 3. The total amount each person has received up to the 1st of June, 1917. Presented July 31, 1917.—*Mr. Hughes (P.E.I.)*.. .. ..*Not printed.*

227. Return to an Order of the House of the 12th April, 1916, for a return showing:—1. How many clerks there are in the Post Office Department who belong to and are paid from the outside service vote, and who work in the inside service. 2. The names of said clerks. 3. Salary paid to each. 4. How long each has been in the service of the Department. 5. If all or any of the clerks have passed any examination. If so, what examination, and on what date or dates. Presented July 14.—*Mr. Turriff*..*Not printed.*

228. Copy of a memorandum presented by the Southern Slav Committee to the representatives of the British Dominions, setting forth the aims and aspirations of the Jugo-slavs (Serbs, Croats and Slovens) subject to Austro-Hungarian rule. Presented by Sir Robert Borden, July 20, 1917.. .. ..*Not printed.*

CONTENTS OF VOLUME 21—*Continued.*

229. Claims made by Minister of Justice relating to payment of duties by certain provinces. (*Senate.*).. .. ..*Not printed.*

230. Copy of Report of Honourable Sir Ezekiel McLeod, Chief Justice of the Province of New Brunswick, and the Honourable Louis Tellier, retired Judge of the Superior Court of the Province of Quebec, Commissioners appointed under the Inquiries Act of Canada, being Revised Statutes of Canada, 1906, Chapter 104 and Amending Acts, by virtue of an Order in Council passed on the 6th June, 1917, whereby the said Commissioners were empowered and directed to conduct an inquiry and investigation for the purpose of reviewing and considering the evidence taken by Mr. Justice Galt, a Commissioner appointed by the Lieutenant-Governor of Manitoba on the 15th day of July, 1916, to investigate and report upon certain matters of concern to the Local Government of the said province, in the execution of such Commission, and to review and consider his reports and findings on such evidence; and to report whether such evidence sustains or supports the findings of the said Commissioner, as set forth in such reports, in so far as they reflect upon or prejudicially affect the honour or integrity of the Hon. Robert Rogers or the honesty of his dealings or transactions. Presented by Hon. Mr. Doherty, July 27, 1917.. ..*Printed for distribution—Members and Senators only.*

230*a*. Copy of evidence, exhibits, etc., in respect to the Report of Honourable Sir Ezekiel McLeod, Chief Justice of the Province of New Brunswick, and the Honourable Louis Tellier, retired Judge of the Superior Court of the Province of Quebec, Commissioners appointed under the Inquiries Act of Canada, being Revised Statutes of Canada, 1906, Chapter 104 and Amending Acts, by virtue of an Order in Council passed on the 6th June, 1917, whereby the said Commissioners were empowered and directed to conduct an inquiry and investigation for the purpose of reviewing and considering the evidence taken by Mr. Justice Galt, a Commissioner appointed by the Lieutenant-Governor of Manitoba on the 15th day of July, 1916, to investigate and report upon certain matters of concern to the Local Government of the said province, in the execution of such Commission, and to review and consider his reports and findings on such evidence; and to report whether such evidence sustains or supports the findings of the said Commissioner as set forth in such reports, in so far as they reflect upon or prejudicially affect the honour or integrity of the Hon. Robert Rogers, or the honesty of his dealings or transactions. Presented by Hon. Mr. Doherty, August 9, 1917.. .. ..*Not printed.*

231. Return to an Order of the House of the 13th June, 1917, for a copy of all correspondence, letters, telegrams and other papers relating to a contract for carrying mails between Grand River and Fourchu, in the County of Richmond, Nova Scotia, in the years 1916 and 1917. Presented July 23, 1917.—*Mr. Kyte*.. .. ..*Not printed.*

232. Return to an Order of the House of the 30th April, 1917, for a copy of all papers, letters, telegrams and documents relative to the purchase of land in Vancouver, B.C., for the purpose of an armoury, since January 1, 1913. Presented July 30, 1917.—*Mr. Macdonald*.. .. ..*Not printed.*

233. Return to an Order of the House of the 1st February, 1917, for a return showing:—1. The names and present rank of all appointees as Chief Recruiting Officers or as District or Special Recruiting Officers, not local or regimental, made since the beginning of the war. 2. The dates of their respective appointments. 3. The ages and vocations of respective appointees. 4. The name of military organization, if any, in which appointees had previously served. 5. The rank of appointees while serving in any military organization. 6. Whether the services of any of these appointees have been dispensed with. 7. If so, their names, and dates on which they were retired. Presented July 31, 1917.—*Mr. Turriff*.. .. ..*Not printed.*

234. Return to an Order of the House of the 31st January, 1917, for a return showing:—1. The date of the last order given by the Government to the Ross Rifle Company. 2. The number of rifles ordered. 3. Whether a recommendation of the British Army Council for the utilization of existing Canadian facilities in manufacturing the new and improved Lee-Enfield was received by the Government. 4. The date of the recommendation, and when it was received. 5. Whether the recommendation has been acted upon. Presented July 31, 1917.—*Mr. Turriff*.. .. ..*Not printed.*

CONTENTS OF VOLUME 21—*Continued.*

235. Return to an Order of the House of the 20th June, 1917, for a return showing:—1. The names of the members of the military staff at North Vancouver. 2. Their respective duties or occupations. 3. The rank and rate of pay of each. 4. The amount that has been paid to each. 5. Upon what date or dates the members of the said staff enlisted, and how long they have been attached to the staff. Presented July 31, 1917.—*Mr. Murphy*.. .. ..*Not printed.*

235*a*. Return to an Order of the House of the 21st June, 1917, for a return showing the names, rank, pay, and nature and place of employment of all officers attached to headquarters at Halifax and the various departments of the military service or connected in any way with Military Division No. 6. Presented August 2, 1917.—*Mr. Tobin*.. ..*Not printed.*

236. Return to an Order of the House of the 18th July, 1917, for a return giving a list of the different Commissions created since the beginning of the war, concerning the soldiers, their pensions, hospitals, etc., showing the names of the various Commissioners who have comprised said Commissions. Presented July 31, 1917.—*Mr. Boulay*.. .. ..*Not printed.*

237. Copy of Financial Statements in respect to the Canadian Northern Railway System: 1. Balance Sheet, 30th June, 1916. 2. Statement of Securities Issued and Fixed Charges, 30th June, 1917. 3. Statement of Liabilities, 15th June, 1917. 3*a*. Statement of Equipment Account. 4. List of Securities for Loans. 5. Gross and Net Earnings, 30th June, 1917. 6. Comparison of Earnings, 1915, 1916 and 1917. 7. Statement *re* Capital Expenditure and Betterments, year ending 30th June, 1917. 8. Mileage. And also,—Statements showing bonds, etc., authorized, issued and outstanding, and net proceeds therefrom; interest payable during the period July 1, 1917, to June 30, 1918; and estimated cash requirements for period July 1, 1917, to June 30, 1918, in respect to the Grand Trunk Railway and Grand Trunk Pacific Branch Lines. Presented by Sir Robert Borden, July 20, 1917.. .. ..*Not printed.*

237*a*. Copy of Mortgage Deed of Trust securing an issue of $45,000,000 of Canadian Northern Railway securities, guaranteed by the Dominion Government, issued under the legislation of 1914. Also,—Copy of Mortgage Deed dated 26th June, 1916—The Canadian Northern Ontario Railway Company to His Majesty the King—securing certain advances from a loan of $15,000,000 made by His Majesty to the Canadian Northern Railway Company. And also,—Copy of Audit of Revenue and Expenditure Accounts of the Canadian Northern Railway System for the months of May, June, July, August, September, October, November and December, 1916, and for January and February, 1917. Presented by Sir Thomas White, August 8, 1917.. .. ..*Not printed.*

237*b*. Statement of amounts advanced by the Government of Canada to the Canadian Northern Railway Company on interest account to date. And also,—Financial Statements of the Canadian Northern Railway, as follows:—1. Interim Condensed Balance Sheet as at April 30, 1917. 2. Statement of estimate of cost to complete lines and terminals under construction and financial provision for same. 3. Statement of Contractors' and other Construction accounts outstanding, 30th June, 1917. 4. Memorandum *re* unsold lands. 5. Estimate of amount required for betterments and rolling stock for three years. Presented by Sir Thomas White, August 13, 1917.. .. ..*Not printed.*

238. Copy of Order in Council, P.C. 1881, dated 19th August, 1916, recommending that in the case of officers, warrant officers and non-commissioned officers reverting to lower rank in order to proceed to the front, no reduction in separation allowance or pension shall be made. And also,—Copy of Order in Council, P.C. 2008, dated 20th July, 1917, cancelling Order in Council, P.C. 1615, dated 13th June, 1917, and amending Order in Council, P.C. 1881, dated 19th August, 1916, in respect to separation allowances and pensions to those reverting to lower rank, in order to proceed to the front. Presented by Sir Edward Kemp, August 2, 1917.. .. ..*Not printed.*

239. Return to an Order of the House of the 30th July, 1917, for a copy of all correspondence exchanged between the Board of Trade of the City of Quebec and the Prime Minister on the subject of the Report of the Special Commission on Railways. Presented August 2, 1917.—*Sir Wilfrid Laurier*.. .. ..*Not printed.*

CONTENTS OF VOLUME 21—*Continued.*

240. Return to an Order of the House of the 13th June, 1917, for a statement showing the travelling expenses of Maurice LeBlanc, general foreman of the Department of Public Works, Bonaventure County, since his appointment to date. Presented August 8, 1917. —*Mr. Marcil (Bonaventure)*.. .. ..*Not printed.*

241. Return to an Order of the House of the 30th April, 1917, for a copy of all letters, petitions, correspondence and telegrams exchanged between the Government, the resident engineer and all other persons concerning the dredging work done at Ste. Anne de Bellevue, Pointe Fortune, Ottawa River channel between Ile au Foin and Ile Paquin, Graham channel, Rigaud channel, Hudson Heights channel, Ile Perrot Church, Ile Perrot South wharf and Ile Perrot North wharf, since 1904. Also a statement showing the amounts paid to different persons or companies for such work, giving the dates of payment, along with a copy of the estimates already brought down at my request regarding the above, previous to 1904. Return to an Order of the House of the 30th April, 1917, for a copy of all letters, petitions, correspondence, telegrams and reports exchanged between the Government, the resident engineer of the district, and all other persons, concerning the dredging work done since 1904 at the wharf of Ile Perrot North, South and the Church, Dorion Bay channel, Vaudreuil Village channel, Pointe Cavagnal, Como, Hudson Heights channel, Graham channel, Rigaud River channel, Ottawa River, Iles aux Poires channel, Pointe Fortune and Ste. Anne de Bellevue channel. Also a statement showing the amount of money paid to divers persons, companies, etc., for such works, along with copy of statements already presented at my request in connection with the same work, previous to 1904. Presented August 8, 1917. —*Mr. Boyer*.. .. ..*Not printed.*

242 Return to an Order of the House of the 14th May, 1917, for a copy of all letters, petitions, correspondence, telegrams and reports received by the Government since September, 1911, to the present day, in any way referring to the extension and repairs to Finlay Point wharf. Presented August 8, 1917.—*Mr. Chisholm*.. .. ..*Not printed.*

243. Return to an Order of the House of the 30th April, 1917, for a copy of all correspondence in the possession of the Department of Public Works bearing date after September 1, 1915, relating to wharves, breakwaters and other public works situate in the County of Antigonish, Nova Scotia. Presented August 8, 1917.—*Mr. Sinclair*.. .. .. ..*Not printed.*

244. Return to an Order of the House of the 7th May, 1917, for a copy of all documents, correspondence, reports, accounts, pay-lists, etc., in connection with the work done on the Government wharves at Cross Point, Miguasha, St. Omer and New Carlisle, Quebec, since 1912. Presented August 8, 1917.—*Mr. Marcil (Bonaventure)*... ..*Not printed.*

245. Return to an Order of the House of the 14th May, 1917, for a copy of all letters, petitions, correspondence, telegrams and reports received by the Government since September, 1911, to the present day, in any way referring to the wharf at Marble Mountain. Presented August 13, 1917.—*Mr. Chisholm*.. .. ..*Not printed.*

246. Return to an Order of the House of the 14th May, 1917, for a copy of all letters, petitions, correspondence, telegrams and reports received by the Government since September, 1911, to the present day, in any way referring to the extension of the pier at Margaree Harbour. Presented August 13, 1917.—*Mr. Chisholm*.. .. ..*Not printed.*

246*a*. Return to an Order of the House of the 14th May, 1917, for a copy of all letters, petitions, correspondence, telegrams and reports received by the Government since September, 1911, to the present day, in any way referring to the breakwater at Margaree Harbour. Presented August 13, 1917.—*Mr. Chisholm*.. .. ..*Not printed.*

247. Return to an Order of the House of the 14th May, 1917, for a copy of all letters, petitions, correspondence, telegrams and reports received by the Government since September, 1911, to the present day, in any way referring to the Port Hood wharf. Presented August 13, 1917.—*Mr. Chisholm*.. .. ..*Not printed.*

CONTENTS OF VOLUME 21—*Continued.*

248. Return to an Order of the House of the 14th May, 1917, for a copy of all letters, petitions, correspondence, telegrams and reports received by the Government since September, 1911, to the present time, in any way referring to the opening of Inverness Harbour. Presented August 13, 1917.—*Mr. Chisholm*.. .. ..*Not printed.*

249. Return to an Order of the House of the 23rd April, 1917, for a copy of all papers, documents, petitions, memoranda, correspondence, etc., with reference to the Government of the Dominion of Canada building competing telephone lines in British Columbia paralleling lines already in operation of the Okanagan Telephone Company, Limited. Presented August 13, 1917.—*Mr. Carvell*.. .. ..*Not printed.*

250. Return to an Order of the House of the 30th April, 1917, for a copy of all correspondence in the Department of Public Works bearing date after September 1, 1915, relating to wharves, breakwaters and other public works in the County of Guysborough, Nova Scotia. Presented August 13, 1917.—*Mr. Sinclair*.. .. ..*Not printed.*

251. Return to an Order of the House of the 30th April, 1917, for a copy of all papers, records and other documents concerning the reference by the Dominion Government to the question relating to the exclusive right of fishing in the tidal waters of the province of Quebec. Presented August 15, 1917.—*Mr. Lemieux*.. .. ..*Not printed.*

252. Return to an Order of the House of the 9th July, 1917, for a return showing the names of all persons employed in connection with the Office of the Commissioner of Live Stock in the Province of Saskatchewan, showing the salaries and expenses paid them; and also showing the number of stallions and bulls placed in Saskatchewan when the said office was established. Presented August 15, 1917.—*Mr. Thomson (Qu'Appelle)*.
Not printed.

253. Return to an Order of the House of the 14th May, 1917, for a copy of all letters, telegrams and reports between the Department of the Naval Service of the Department of Marine and Fisheries, and any and all persons in connection with the seizure of certain fishery boats, fishing tackle and equipment being used in the illegal fishing of lobsters in the Straits of Northumberland in the fall of 1916, together with a copy of the evidence taken before one M. G. Teed, Esquire, acting as a commissioner to inquire into this matter, and his report and finding thereon. Presented August 16, 1917.—*Mr. Copp.*
Not printed.

254. Return to an Order of the House of the 30th July, 1917, for a copy of all correspondence between the Department of Militia and Defence of Canada, the War Purchasing Commission of Canada, and the British War Office, concerning a target practice rod or the use of same by the Canadian Expeditionary Force. Presented August 20, 1917.—*Mr. Maclean (Halifax)*.. .. ..*Not printed.*

255. Return to an Order of the House of the 7th June, 1917, for a return showing:—1. Whether the Department of Agriculture supply thoroughbred bulls for improvement of stock to applicants for the same. 2. If so, if any such bulls have been sent into the County of Dorchester, Quebec, and when. 3. At whose request these bulls were sent, and if they belonged to the Department of Agriculture. 4. If so, on what condition they were supplied. 5. From whom the department purchased the animals referred to. 6. The price paid. 7. If any official of the Department of Agriculture has made an investigation as to where these bulls are at the present time. 8. If so, the substance of their report. 9. Whether the said bulls are being used for the purpose for which they were intended. Presented August 21, 1917.—*Mr. Lanctôt*.. .. .. ..*Not printed.*

256. Return to an Order of the House of the 1st August, 1917, for a return showing the amount which has been paid to the Sydney *Daily Post*, newspaper, by all the departments of the Government for printing and advertising, since the 1st of November, 1911. Presented August 21, 1917.—*Mr. Kyte*.. .. ..*Not printed.*

257. Return to an Order of the House of the 1st August, 1917, for a return showing the gross amount paid to the Halifax *Herald*, the *Evening Mail*, Halifax, and the Royal Print and Lithographing Company, Halifax, by all the departments of the Government for printing, advertising and all other services since November 1, 1911. Presented August 21, 1917.—*Mr. Sinclair*.. .. ..*Not printed.*

CONTENTS OF VOLUME 21—*Continued.*

258. Return to an Order of the House of the 18th June, 1917, for a copy of all accounts, papers, claims and correspondence regarding demands put forward by all persons who have claimed to have sustained loss or damage by the fire in the Parliament Buildings in February, 1916. Presented August 21, 1917.—*Mr. Lanctôt*.. .. .. ..*Not printed.*

259. Return to an Order of the House of the 14th May, 1917, for a copy of all communications, letters, reports, petitions and other documents on behalf of the Physicians and Medical Associations of this country, asking for the repeal of The Proprietary or Patent Medicine Act and the presentation of a new Act on the matter in order to render more efficient the control of these medicine preparations, and to add on the prohibition list such drugs or medicines as are generally dangerous to health and conducive to certain criminal practices. Presented August 21, 1917.—*Mr. Lapointe (Kamouraska)*.
Not printed.

260. Copy of correspondence between the Honourable Robert Rogers and the Right Honourable Sir Robert Borden, Prime Minister, with reference to the resignation of the former as Minister of Public Works of Canada.—(*The Senate.*).. .. ..*Not printed.*

261. Return to an Order of the Senate dated the 11th day of July, 1917, for a Statement showing the number of officers and men of the Canadian Expeditionary Force who have been classed as unfit for military service; whether the military authorities have given consideration to the possibility of utilizing the services of those men in a secondary capacity; whether those who have been classed as unfit continue to draw military pay; the number who have deserted from the various units between 1st October, 1914, and 1st June, 1917; and the number discharged from the various units since 1st October, 1914.—(*The Senate.*).. .. ..*Not printed*

262. Return to an Order of the Senate, dated 7th June last, for a return showing:—1. The name and rank of each person who at the outbreak of the war in August, 1914, was an officer, commissioned or provisional, of the 78th Regiment (Highlanders), of Pictou County, Nova Scotia. 2. The length of time each of such persons was attached to said regiment. 3. (*a*) The name of each of said officers who joined the Canadian Overseas Forces. (*b*) The unit to which he was attached. (*c*) The rank with which he was attached. (*d*) The date at which he was attached. 4. The name of each person who since the outbreak of war became attached as provisional officers to said 78th Regiment and the date at which such person became attached and his rank. 5. (*a*) The name of each of the officers referred to in paragraph 4 who joined the Canadian overseas forces. (*b*) The unit to which he was attached. (*c*) The rank with which he was attached. (*d*) The date at which he was attached. 6. The name of each of the officers referred to in each of the foregoing paragraphs who were in active service at the fighting front, the units with which they served, and the length of time they served. 7. Particulars as to each of the said officers showing where each one was on May 1, 1917, to what unit he was attached, and what his rank was at that time. 8. If any of these officers have gone to the fighting front since May 1, state name, unit, rank and date.—(*The Senate*.)
Not printed.

263. Part return to an humble Address of the Senate to His Excellency the Governor General, dated the 8th instant, showing all the correspondence between the Department of Militia and Defence and Clarence J. McCuaig; also, between the same and the first Purchasing Committee appointed by Sir Robert Borden, of which the Honourable Robert Rogers was Chairman, and between the said Clarence J. McCuaig and the Committee of which the Honourable Sir Edward Kemp is or was Chairman, or with any of the members of the said committee.—(*The Senate.*).. .. ..*Not printed.*

264. Eighth Annual Report of the Commission of Conservation for the fiscal year ending 31st March, 1917. Presented by Hon. Mr. Burrell, September 1, 1917.. .. .. ..*Not printed.*

265. Return to an Order of the House of the 30th August, 1917, for a return showing:—1. The number of additional buildings and offices that have been rented by the various departments of the Government in the City of Ottawa during the calendar years, 1914, 1915, 1916 and 1917. 2. The names of the lessors, the length of the lease and the respective rentals of said buildings. 3. What department in each case is occupying said premises. Presented September 3, 1917.—*Mr. Sinclair*.. .. ..*Not printed.*

CONTENTS OF VOLUME 21—*Continued.*

266. Return to an Order of the House of the 11th July, 1917, fo a copy of all correspondence and other documents relating to the granting to beam trawlers registered in the United States the privilege of using ports in the Province of Nova Scotia for the purchasing of supplies, the shipping of men, etc., without license therefor as required under the modus videndi. Presented September 3, 1917.—*Mr. Kyte*.. .. ..*Not printed.*

267. Copy of contract dated 8th March, 1917, between His Majesty the King and Wallace Shipyards, Limited, for the construction and delivery of one wooden auxiliary sailing ship. Also,—Copy of contract dated 1st June, 1917, between His Majesty the King and Lamond and Harrison for the construction and delivery of one wooden auxiliary sailing ship. Presented by Hon. Mr. Cochrane, September 3, 1917.. .. ..*Not printed.*

268. Return to an Order of the Senate, dated the 15th day of June last, for a return made to an Order of the House of Commons, of the 7th February, 1916, for a copy of all correspondence and reports on the claims of Sealers of British Columbia under the last treaty with the American Republic, and all papers connected therewith.—(*The Senate.*)
Not printed.

269. Copy of Order in Council, P.C. 2245, dated 3rd September, 1917, appointing the Deputy Minister of Justice, Oliver Mowat Biggar, of the City of Edmonton, John H. Moss, of the City of Toronto, Louis Loranger, of the City of Montreal, and Lt.-Col. H. A. C. Machin, of the Town of Kenora, Ont., a council to advise and assist in the administration and enforcement of the Military Service Act, 1917, to be known as the Military Service Council. Presented by Sir Robert Borden, September 4, 1917.. ..*Not printed.*

270. Return to an Order of the House of the 21st May, 1917, for a copy of all reports, letters, telegrams, correspondence and any other papers in connection with the question of locating the 210th Battalion at Regina and Moosejaw respectively during the winter of 1916-17. Presented September 6, 1917.—*Mr. Knowles*.. .. . .*Not printed.*

271. Return to an Order of the House of the 14th May, 1917, for a copy of all letters, correspondence, telegrams and reports received by the Government since September, 1911, to the present day, in any way referring to the appointment of a man in charge of the storm signals at Grand Etang and Margaree Harbour. Presented September 6, 1917.—*Mr. Chisholm*.. .. .. ..*Not printed.*

272. Return to an Order of the House of the 7th May, 1917, for a return showing the different rural mail routes established in the constituency of Qu'Appelle since the 1st day of January, 1916, showing their location and date of establishment. Also, a list of all rural mail routes now being established or under consideration at the present time in the same constituency. Presented September 7, 1917.—*Mr. Thomson (Qu'Appelle).*
Not printed.

273. Return to an Order of the House of the 6th March, 1916, for a copy of all telegrams, letters, petitions and documents of all kinds in any way referring to the change in the Inverness-Margaree mail route from the west to the east of the Margaree river, from a point at Margaree Forks to Chapel Bridge. Presented September 7, 1917.—*Mr. Chisholm*.. .. ..*Not printed.*

274. Copy of Order in Council, P.C. 2199, dated 10th August, 1917: Rules and Regulations enacted in lieu of the Classification, Rules and Regulations contained in Order in Council, P.C. 1296, of the 15th May, 1917, in respect to War badges for members of the Canadian Expeditionary Force. Presented by Sir Edward Kemp, September 13, 1917.
Not printed.

275. Copy of Order in Council, P.C. 2552, dated 13th September, 1917, recommending that Certificates of Naturalization may be issued under the Naturalization Act, 1914, to alien enemies who have resided for many years in Canada, on its being shown that they are clearly in sympathy with the United Kingdom and its allies in the present war, and that they have no pro-German or other alien enemy affiliations or connections. Presented by Sir Robert Borden, September 14, 1917.. .. ..*Not printed.*

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276. Copy of *Canada Gazette* dated 12th September, 1917, containing a list and location of Local Tribunals established to hear and decide applications for certificates of exemption from Military Service. Presented by Hon. Mr. Doherty, September 14, 1917.
Not printed.

277. Copies of Orders in Council, dated 15th September and 17th September, 1917, respectively, appointing Registrars for the Provinces of British Columbia, New Brunswick, Quebec, Saskatchewan, Manitoba, Ontario, Alberta and Prince Edward Island, under the provisions and for the purposes of the Military Service Act, 1917. Presented by Sir Robert Borden, September 17, 1917.. .. .. .

Scene on Brandon Experimental Farm.

APPENDIX TO THE REPORT OF THE MINISTER OF AGRICULTURE

EXPERIMENTAL FARMS

REPORTS FROM THE

DIRECTOR
DIVISION OF CHEMISTRY
DIVISION OF FIELD HUSBANDRY
DIVISION OF ANIMAL HUSBANDRY

FOR THE YEAR ENDING MARCH 31, 1916.

PRINTED BY ORDER OF PARLIAMENT.

OTTAWA
PRINTED BY J. DE L. TACHÉ,
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY.
1917

APPENDIX

TO THE

REPORT OF THE MINISTER OF AGRICULTURE

ON

EXPERIMENTAL FARMS

OTTAWA, March 31, 1916.

SIR,—I have the honour to submit, for your approval, the twenty-ninth annual report of the work carried on at the several Dominion Experimental Farms and Stations.

The division of the whole report into two volumes and into two sections, has again been made as in the two preceding years.

Section A contains my report as Director followed by a summary of the year's results on the Central Farm and on the branch Experimental Farms, Stations, and Sub-stations.

Section B gives the detailed results of the experimental work throughout the Farms system, classified under the heads of Animal Husbandry, Bee-keeping, Botany, Cereal Breeding and Variety Testing, Chemistry, Extension and Publicity, Field Husbandry, Forage Crops, Horticulture (including Vegetable Gardening and Flowers), Illustration Stations, Poultry Husbandry, and Tobacco Husbandry.

Section A is designed to give a brief but readable resumé of the work carried on over the Experimental Farms system.

Section B is intended primarily to aid the farmer in the details of his daily work.

I have the honour to be, sir,
Your obedient servant,

J. H. GRISDALE.
Director, Dominion Experimental Farms.

To the Honourable
The Minister of Agriculture,
Ottawa.

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ANNUAL REPORT OF THE EXPERIMENTAL FARMS

FOR THE YEAR ENDING MARCH 31, 1916.

REPORT OF THE DIRECTOR

J. H. GRISDALE, B. Agr.

FIELD CROP AND LIVE STOCK NOTES FOR 1915.

A marked increase in area sown, and a most favourable season, resulted in the largest crop of grain ever harvested in Canada. In 1914, the area sown was estimated to be 35,102,175 acres. Drought caused a complete crop failure over 1,665,500 acres, so that the area actually harvested in that year was 33,436,675 acres. In 1915 the area sown and harvested was estimated at 37,063,455 acres, an increase in productive acreage of 3,626,780 over 1914. The average yield per acre of the principal cereals in 1915 was the highest on record and their quality generally superior to the preceding year. The total value of the field crops of Canada in 1915 is estimated at $797,669,500, compared with $638,580,300 for the previous year, an increase of $159,089,200. Tables I and II give further details of the yields and values of the principal field crops.

Table III gives a comparison of the numbers of the principal classes of live stock in Canada for the years 1911-15, inclusive. Decreases in number in the eastern provinces during 1915 will be noted, horses being the only exception. In the Prairie Provinces and British Columbia an increase in all classes has taken place, with the exception of swine, which show a marked falling-off in numbers.

TABLE I.—Comparison of Yields and Prices Obtained for the Years 1914-15.

Crop.	Average Yield per acre.		Average Price per bush.		Total Production.	
	1914	1915	1914	1915	1914	1915
	bush.	bush.	$	$	bush.	bush.
Fall wheat	21·41	29·41	1·05	·90	20,837,000	35,551,600
Spring wheat	15·07	28·93	1·24	·83	140,443,000	340,752,000
All wheat	15·67	28·98	1·22	·83	161,280,000	376,303,600
Oats	31·12	45·76	·48	·34	313·078·000	520,103,000
Barley	24·21	35·33	·60	·50	36,201,000	53,331,300
Rye	18·12	21·32	·83	·79	2,016,800	2,394,100
Peas	17·64	17·73	1·46	1·66	3,362,500	3,478,850
Beans	18·20	16·70	2·31	3·05	797,500	723,400
Buckwheat	24·34	22·88	·72	·75	8,626,000	7,865,900
Mixed grains	35·36	37·54	·66	·57	16,382,500	17,523,100
Flax	6·62	13·18	1·03	1·50	7,175,200	10,628,000
Corn for husking	54·39	56·72	·71	·71	13,924,000	14,368,000
Potatoes	180·02	130·81	·49	·57	85,672,000	62,604,000
Turnips, etc	394·30	372·21	·27	·26	69,003,000	64,281,000
	tons.	tons.	per ton.	per ton.	tons.	tons.
Hay and clover	1·28	1·39	14·23	14·22	10,259,000	10,953,000
Fodder corn	10·25	10·00	4·91	4·96	3,251,480	3,429,870
Sugar beets	8·98	7·83	5·99	5·50	108,600	141,000
Alfalfa	2·42	2·83	14·17	12·98	218,360	261,955

TABLE II.—Comparison of Eastern Canada, Prairie Provinces, and British Columbia, as to Yields and Prices Obtained.

Crop.	Eastern Provinces.				Prairie Provinces.				British Columbia.			
	Aver. Yield per acre.		Aver. Prices obtained.		Aver. Yield per acre.		Aver. Prices obtained.		Aver. Yield per acre.		Aver. Prices obtained.	
	1914	1915	1914	1915	1914	1915	1914	1915	1914	1915	1914	1915
	bush.	bush.	$	$	bush.	bush.	$	$	bush.	bush.	$	$
Fall wheat	21·51	28·34	1·08	·93	20·82	33·83	·94	·80	31·82	33·44	1·22	·91
Spring wheat	19·70	20·83	1·15	1·10	14·94	29·11	1·25	·82	27·77	32·43	1·23	·96
Oats	34·19	36·15	·52	·44	28·18	53·23	·44	·28	55·93	61·84	·62	·49
Barley	29·75	32·87	·69	·60	20·87	36·71	·52	·45	37·29	40·36	·92	·64
Peas	16·26	17·63	1·46	1·65	17·25	21·44	1·47	1·53	30·00	29·75	1·45	1·24
Rye	17·21	19·55	·87	·82	21·45	27·41	·71	·73	.....	.....	.....	.....
Flax	15·37	12·32	1·72	1·77	6·57	13·18	1·02	1·50	.....	.....	.....	.....
Potatoes	191·01	122·01	·42	·62	130·18	147·69	·82	·44	182·00	247·28	·78	·45
Turnips, etc	413·78	387·59	·23	·24	253·91	252·27	·65	·45	431·00	455·61	·53	·39
	tons.	tons.			tons.	tons.			tons.	tons.		
Hay and clover	1·25	1·35	14·58	14·60	1·53	1·78	8·28	8·83	2·23	2·34	15·54	14·57
Sugar beets	9·00	7·83	6·00	5·50	6·00	.....	5·00	.....	.....	.....	.....	.....
Fodder corn	10·53	10·41	4·84	4·90	5·13	3·51	7·16	7·49	8·00	12·62	6·00	4·00
Alfalfa	2·25	2·72	14·93	13·33	2·59	2·70	12·15	10·07	3·33	3·52	13·60	14·84

TABLE III.—Farm Live Stock, 1911-15.

	1911	1912	1913	1914	1915
Eastern Provinces—					
Horses	1,343,570	1,335,628	1,436,207	1,441,381	1,442,063
Milch cows	2,076,056	2,079,188	2,188,824	2,097,586	2,075,750
Other cattle	2,560,622	2,410,671	2,479,406	1,904,976	1,848,504
Sheep	1,850,900	1,750,994	1,747,108	1,630,714	1,569,488
Swine	2,864,603	2,638,410	2,491,564	2,357,128	2,269,029
Western Provinces—					
Horses	1,194,927	1,296,994	1,369,283	1,445,652	1,492,681
Milch cows	484,170	491,289	516,011	539,998	553,152
Other cattle	1,324,405	1,315,681	1,336,098	1,359,464	1,450,212
Sheep	285,130	290,685	336,423	382,331	422,770
Swine	712,221	806,415	922,221	1,038,102	804,328
British Columbia—					
Horses	57,415	59,735	60,518	60,705	61,355
Milch cows	33,953	34,011	35,599	35,702	37,944
Other cattle	105,230	101,021	100,183	99,091	100,439
Sheep	39,272	40,702	45,000	45,000	46,404
Swine	33,604	32,485	34,541	39,031	38,543

NEW FARMS.

KAPUSKASING, NORTHERN ONTARIO.

An internment camp is located at this point on the National Transcontinental railway, and the prisoners are being used in clearing and draining work preparatory to the establishment of an Experimental Station. The area for the Station has been delimited, and comprises some 1,200 acres. Some field crops will be grown there in

the season of 1916. During the winter a cattle and horse barn was partially built and will probably be finished during the coming summer, and the foundation put in for a cattle barn with feed room adjoining. A house for the man in charge of horses was also built.

SPIRIT LAKE, QUEBEC.

The internment camp at Spirit lake, Quebec, at which point it is also proposed to place an Experimental Station, is located on the National Transcontinental railway. The area for the Station has not yet been laid out nor have any farm buildings been erected. A considerable amount of clearing and breaking has been done by the prisoners, under the supervision of Internment Operations. About 300 acres will be under the plough the coming season, with from one-half to two-thirds of it under various farm and garden crops.

METEOROLOGICAL RECORDS AT OTTAWA.

TABLE OF METEOROLOGICAL OBSERVATIONS taken at the Central Experimental Farm, Ottawa, from April 1, 1915, to March 31, 1916, giving maximum, minimum and mean temperature for each month with date of occurrence, also the rainfall, snowfall, and total precipitation.

Month.	Maximum.	Minimum.	Range.	Mean.	Highest.	Date.	Lowest.	Date.	Rainfall.	Snowfall.	Total Precipitation.	Number of days Precipitation.	Heaviest in 24 hours.	Date.
	°	°	°	°	°		°		In.	In.	In.		In.	
April	61·01	38·36	22·65	49·68	87·2	25th	25·0	4th	0·99	S.	0·99	9	0·44	6th.
May	63·04	40·64	22·39	51·83	78·6	31st	31·8	16th	1·86	.....	1·86	14	0·31	8th.
June	76·78	53·08	23·70	64·93	90·1	5th	46·2	9th & 24th	2·94	.....	2·94	7	1·23	15th.
July	80·60	56·89	23·70	68·74	92·0	31st	50·0	7th	2·12	.....	2·12	13	1·08	16th.
August	73·54	55·44	18·10	64·49	86·0	11th	38·0	27th	7·09	.....	7·09	17	1·82	22nd.
September	71·13	51·02	20·11	61·07	88·7	15th	35·0	28th & 30th	2·87	.....	2·87	15	0·69	7th.
October	57·77	40·55	17·22	49·16	72·4	13th	26·6	25th	1·30	.....	1·30	10	0·53	5th.
November	41·21	29·03	12·18	35·12	60·8	1st	14·0	18th	1·11	0·50	1·16	16	0·44	15th.
December	27·03	14·29	12·74	20·66	37·0	1st	− 8·2	31st	0·36	38·50	4·21	14	0·84	25th.
January	26·32	7·38	18·93	16·84	42·0	22nd	−16·0	8th	2·02	21·75	4·19	20	0·70	2nd.
February	19·74	3·47	16·27	11·60	41·0	1st	−19·4	21st	T.	42·50	4·25	15	1·10	25th.
March	27·36	7·37	19·99	17·36	52·0	30th	−17·2	18th	.....	26·75	2·67	9	0·95	10th.
	.....	.....	....	....	....	.....	.....	.....	22·66	130·00	35·65	159	....	.....

Rain or snow fell on 159 days during the 12 months.
Heaviest rainfall in 24 hours, 1·82 inches, on August 22.
Heaviest snowfall in 24 hours, 11·00 inches, on February 25.
The highest temperature during the twelve months was 92·0° on July 31.
The lowest temperature during the twelve months was 19·4° on February 21.
During the growing season rain fell on nine days in April, fourteen days in May, seven days in June, thirteen days in July, seventeen days in August, and fifteen days in September.
June shows the lowest number of days with precipitation, viz., seven.
Total precipitation during the twelve months, 35·65 inches, as compared with 24·67 inches during 1914–15.

RAINFALL, SNOWFALL, AND TOTAL PRECIPITATION from 1890 to 1915-16; also the average annual amount that has fallen.

Year.	Rainfall.	Snowfall.	Total Precipitation.
1890	24·73	64·85	31·22
1891	30·19	73·50	37·54
1892	23·78	105·00	34·28
1893	31·79	72·50	39·04
1894	23·05	71·50	30·20
1895	27·01	87·50	35·76
1896	21·53	99·75	31·50
1897	24·18	89·00	33·08
1898	24·75	112·25	35·97
1899	33·86	77·25	41·63
1900	29·48	108·00	40·72
1901	29·21	97·25	38·91
1902	25·94	101·75	36·10
1903	26·43	85·00	34·92
1904	25·95	108·75	36·79
1905	23·71	87·25	32·42
1906 (January 1 to March 31)	1·90	24·50	4·34
1906–07	21·73	72·50	28·94
1907–08	24·70	134·75	38·18
1908–09	22·13	107·90	32·91
1909–10	28·40	61·25	34·51
1910–11	18·94	88·25	27·72
1911–12	20·12	98·50	29·95
1912–13	32·54	106·50	43·18
1913–14	21·51	70·25	28·51
1914–15	16·77	78·50	24·67
1915–16	22·66	130·00	35·65
Total for 26 years and 3 months	656·99	2,414·00	898·64
Average for 26 years	25·26	92·84	34·56

RECORD OF SUNSHINE at the Central Experimental Farm, Ottawa, from April, 1915, to March 31, 1916.

Months.	Number of days with Sunshine.	Number of days without Sunshine.	Total hours Sunshine.	Average Sunshine per day.
April	27	3	209·4	6·98
May	28	3	229·5	7·40
June	29	1	301·2	10·04
July	30	1	282·6	9·11
August	27	4	182·4	5·88
September	29	1	217·2	7·24
October	28	3	153·1	4·93
November	25	5	88·2	2·94
December	15	16	64·2	2·07
January	20	11	87·4	2·81
February	21	8	114·4	3·94
March	26	5	196·3	6·33

WILLIAM T. ELLIS,
Observer.

FLAX INVESTIGATIONS.

The production of flax for fibre has been seriously affected by the present war. The Russian crop, to a great extent, is unavailable for export; flax production in Belgium is greatly curtailed if not altogether suspended, and Ireland, the third great flax-growing country, is quite unable to meet the world's demand.

It was thought, therefore, that this was a fitting time to look into the possibilities of growing flax for fibre in Canada, on a large scale. The crop has been always grown in the Dominion to a certain extent, and some flax mills are conducted in southwestern Ontario, but it was resolved to test the matter scientifically and carefully in the hope that fibre flax might be raised to the status of one of the recognized profitable field crops of Canada.

Some experimental work on a small scale was carried on at the Central Farm in 1915, and samples of flax straw were secured from other parts of Canada. The work was carried on by Mr. John Adams, Assistant Dominion Botanist, and some very good samples of fibre were secured. The work and its results are dealt with in detail in the report of the Dominion Botanist.

As a preliminary to further investigation, the Director of Experimental Farms visited some of the fibre-flax growing districts and flax mills in the Dominion and in the United States, meeting a number of men engaged in the flax industry. He also had interviews with several of the fibre experts connected with the United States Division of Fibre Investigations.

His findings were embodied in the following report made to the Minister of Agriculture:—

Report of an Investigation into Flax for Fibre Production and upon Information Available upon the Subject in Canada and the United States.

(By J. H. Grisdale, Director, Dominion Experimental Farms.)

Acting under instructions from the Minister of Agriculture, the Hon. Martin Burrell, the writer has during the last two or three weeks made an effort to learn something about the "flax for fibre" producing industry in Canada and the United States as to: (1) information available in government bureaus, (2) men capable of taking part in a propaganda to increase production and encourage the industry in Canada and available for such a purpose, (3) the lines such a propaganda might follow, (4) present state of the flax for fibre producing industry in Canada and the United States, and (5) general information on the subject.

FIBRE DIVISION OF THE UNITED STATES BUREAU OF PLANT INDUSTRY.

Carrying a letter of introduction to Mr. Vrooman, Assistant Secretary for Agriculture, Washington, D.C., I first visited that city. I was unfortunate in finding Mr. Vrooman away, but was referred to Mr. Wm. A. Taylor, Chief of the Bureau of Plant Industry, who gave me what information he could on the subject and referred me to the secretary of the Division of Fibre Investigation. Here I found the secretary willing to give me all the information available, and ready to help me in every way possible. The chief of the division, Mr. L. H. Dewey, was absent as was also his assistant, Mr. F. C. Miles, unfortunately.

My visit to the offices of the Fibre Division showed me, however, that not much information had been collected by the division. The division has in its offices a collection of bulletins and books on the subject of flax for fibre. It has also a cabinet of information of a varied character entered on cards. This cabinet I was permitted to go through but did not find anything of importance that was new to me along the lines above mentioned, the bulletins and publications available being practically the same as I have in my own collection.

A few small machines or instruments of use in fibre work were in the office, viz., measuring rod (metric system), scales, fibre flax thresher, small seed cleaner, tensile-strength tester, small hackles, and small retting vats (wherein were used waters inoculated with cultures from the river Lys in France, the most famous flax-retting stream in the world at the point where it passes through Courtrai), but breakers and scutchers were not in evidence.

The files of the division showed but a very small number of people interested in the actual production of flax for fibre in the United States. The two men apparently recognized as the best men in the industry in the United States were Mr. B. Summers of the Summers Linen Co., Port Huron, Mich., and Mr. McCaul of the Jas. Livingstone Flax Co., Yale, Mich., while in Canada apparently the only man recognized as an authority was G. Howard Fraleigh, Forest, Ont.

Through kindness of Mr. Taylor, I was able to get into touch with Mr. Dewey by telegraph and to make an engagement to meet him in Chicago. This I did and found Mr. Dewey very sympathetic in his attitude toward our efforts to gain information along various lines of interest in connection with fibre flax.

The work being carried on by the Washington Fibre Division with flax is along the following lines:—

(*a*) Improvements of varieties by selection from experimental plots being grown in the United States, and by importation of new varieties. Blue and white blossom varieties are being tried out from seed imported from Russia, Belgium and Ireland.

(*b*) Study of cultural methods on farms in various parts of Michigan and Wisconsin.

(*c*) Study of machinery and manufacturing methods.

(*d*) Study of the fertilizers and soil requirements of the crop.

(*e*) Dissemination through the medium of bulletins and leaflets of information collected.

Mr. Dewey corroborated what I had learned at Washington as to Summers, McCaul, and Fraleigh being among the best men in America from the flax for fibre producers' standpoint.

VISIT TO SUMMERS LINEN CO., PORT HURON, MICH., U.S.A.

Leaving Chicago I next visited Mr. Bertrand S. Summers of the Summers Linen Co., Port Huron, Mich., and was by him shown all through the rather extensive plant of this company. In this plant I was so fortunate as to see every operation under way except the threshing.

This company (which appears to be really Mr. Summers) is the only firm known to carry on chemical retting on a commercial scale in the flax world. The threshed flax is baled and brought in from as far as 25 to 30 miles in box cars. It is retted in a large steel cylinder probably 25 feet long by 10 feet in diameter, lying on its side and having two port holes, with iron doors on top. It will ret about 5 tons at one time. The retting is effected by chemical rather than by bacterial action as in the case of dew, ditch, or tank retting. The formula used is a trade secret, hence was not imparted to me. The process involves heating the whole mass, while the flax is in the retting fluid, to a fairly high temperature. The flax is in the fluid for about three hours. After being thoroughly steeped and heated it is then removed and carried on trucks to be shortly run through a machine like a clothes wringer which removes much of the water, thence through a drying oven and out on to trucks again to be allowed to "nature" (ferment or cure slightly is meant, I presume) for a few days in a special chamber, then run through the breaker and immediately scutched and baled. As it is being baled about 10 per cent of water, by weight, is added and the bales are run back into the fermenting or "naturing" room above mentioned to be left there for a certain period. The temperature and humidity are controlled in this chamber, and much importance was apparently attached to this part of the process.

In Mr. Summers' opinion the most serious problems confronting the grower of flax for fibre to-day are: (1) better varieties, (2) better cultural methods, (3) a pulling machine, (4) better fertilizing methods, (5) more information on best time to harvest, (6) a scutching machine.

He considers that if a puller could be perfected a tremendous advance would have been made in the industry in America, and that fibre flax would immediately take a prominent place among crops over very considerable areas in Canada and the United States. He considers climatic and soil conditions over practically the whole of western Ontario as highly suitable for production of fibre flax.

Mr. Summers has built a flax puller which has given fairly good results, and he thinks that he may yet be able to make a really first-class machine of this kind. Mr. Fraleigh, of Forest, Ontario, with whom I discussed this machine, seemed to think that Mr. Summers would eventually have a really good puller. Mr. Summers has also built a scutching machine which he showed me, but he did not seem particularly optimistic as to its future, admitting that it was far from perfect yet.

Mr. Summers did for some years manufacture rugs from a certain proportion of his output of fibre. These rugs sold well and wear well. He has, however, been forced to abandon the manufacture for the present on account of a fire in his factory and the scarcity of suitable dyes since the beginning of the war. Mr. Summers imports seed from Holland and Russia, and also from Canada. From Holland he gets the best seed from Mr. Lucardie of Rotterdam. Mr. Summers claims to have found a market for a part at least of the ligneous residues from scutching. It is to be used by a certain company as a base for a stock food.

VISIT TO FRALEIGH FLAX MILLS, FOREST, ONTARIO.

Mr. Summers advised me that the best man in the business of producing flax for fibre to-day in America was Mr. G. Howard Fraleigh, Forest, Ontario. So on leaving Port Huron, I crossed to Sarnia, thence to Forest, and there met Mr. Fraleigh, already mentioned several times above.

Mr. Fraleigh I found to be an enthusiastic and energetic grower of "flax for fibre." He has been in the business some twenty-odd years and seems to have made a decided success financially. He handles about 500 acres of flax for fibre each year. His plan of operation is, he states, practically the same as is followed all over Ontario and in Michigan. He rents fields of varying size from farmers in a radius usually of 5 of 6 miles, but occasionally farther afield. The soil preferred is heavy loam, clay loam, or clay. Sometimes fields of lighter soil are selected, but this kind of land is not favoured since the crop is more likely to suffer from drought in the early part of the season, and so be short in the staple. The farmer undertakes to plough the land, at the time (approximately) indicated by the operator, disc-harrow, roll and harrow until ready for the seeder. Once the field is ready to sow the responsibility and the work of the farmer cease. The seeding is done by the operator, as are all subsequent operations in connection with growing and harvesting the crop.

The farmer receives as rent for his land, and as pay for the work above mentioned, from $12 to $15 per acre, with occasionally a bonus if the yield of flax passes a certain tonnage per acre. Sometimes, however, the farmer undertakes to grow the flax and deliver it at the mill at a minimum price per ton, with a bonus if fibre prices will justify.

Seed grown by Mr. Fraleigh is either blue or white flower flax. The blue flower is the earlier, maturing about ten days earlier and yielding a grade of fibre superior to that produced by the white which is, however, considerably longer in the staple, hence practically as valuable for use in America. The seed of both varieties was originally imported from Russia or Belgium, but is grown almost entirely in Canada now. Canadian seed has been found to be as good as imported seed and even superior to the

imported article once it has become acclimatized by being grown for a year or two in Canada.

The pulling is done by boys and women for the most part, but some few men are also employed in this work. Indians are very commonly used for this operation, where available. The same classes of labour are employed in the retting.

The flax on being pulled is dried and then threshed before being retted. It is pulled a little on the green side, but the most of the grain ripens fairly well and from 12 to 15 bushels per acre is expected.

The straw is practically all dew-retted, *i.e.*, retted by spreading thinly on the grass and turning at intervals until completely retted. It is then dried and put in barns or other shelters to await breaking and scutching. These operations are for the most part carried on in the winter, spring, and summer. The autumn season is largely taken up with the pulling, threshing, retting and storing.

Tank retting may be said to be practised not at all in Ontario. Mr. Fraleigh is, however, retting 15 tons of straw this year in two tanks built by him recently and being operated by an Irishman named Robinson brought over from near Belfast, Ireland, a year or so ago.

Samples of tank-retted flax fibre, broken, scutched, and hackled, were sent to Newark mills by Mr. Fraleigh this year. These samples have been pronounced by the fibre expert at these mills, J. Smiley Cooey, Baker Flax Company, Marshall Mills, Newark, N.J., U.S.A., as being superior to anything of the kind heretofore produced in Ontario. Mr. Fraleigh is, accordingly, somewhat elated and proposes to build two more tanks in addition to the two already built, and to go more into the tank retting. He claims that the straw might as well be carried over, as much of it as necessary at least, and retted during the next spring and summer when warm weather again permits of tank retting. The character of the water in the neighbourhood of Forest seems to be suitable for retting purposes. It is soft water, but has not been analyzed by us as yet. We have sent for samples from Mr. Fraleigh's wells and from other points in the western part of Ontario where flax is being grown.

Mr. Fraleigh states that the industry of flax growing for fibre production in Ontario is at present in rather bad shape, for the reason, as he thinks, that the business has to some considerable extent got into the hands of promoters or others having no practical knowledge on the subject, or, at best, very small experience. This is due to the fact that no new blood has been coming into the practical side of the business for some years, and that recently the old men have been dropping out. Their business, where not allowed to go down, has usually been taken hold of by a promoter who has seen in it a chance to make money and is now using all the devices or schemes of the promoters to make it go and to make as much money out of it for himself as he possibly can. He claims that the old-line men and the new men or promoters have little in common.

In the opinion of Mr. Fraleigh, as expressed to me, the thing that would do the most good to the industry in Canada would be the appointment of a man, who could immediately go out and help the producers by showing them how to grade their fibre products. Lack of proper grading methods results, he claims, in the loss of many thousands of dollars each year in Ontario. Such a man might also do something to help the industry by visiting the farmers and giving personal advice, and also by getting out instructive literature.

The above report summarizes as briefly as possible such of the information I have been able to gather on the subject of flax for fibre production in Canada and the United States, as seems to me to be of sufficient importance to justify its incorporation herein.

SUMMARY AND IMPRESSIONS FORMED.

The impression left upon me by all I have been able to see and by the men I have had a chance to interview I shall attempt to summarize in the following few sentences:—

1. Flax for fibre production in the United States is quite a negligible industry. It is confined almost entirely to Michigan, and includes, I am reputably informed, not over five operators. The most important of these are the Summers Linen Company, Port Huron, Mich., and the Jas. Livingstone Flax Mills, Yale, Mich. Recent failures in various parts of the United States in this industry due to wrong methods (due to promoters) would seem to indicate no expansion in the near future.

2. The Fibre Investigation Division of the Bureau of Plant Industry, Washington, has carried on comparatively little investigational work with flax, and is not in a position to assist Canada with either information or men capable of collecting or imparting information on the subject.

3. The industry in Canada, while apparently profitable, is in the hands of a very few people. There would seem to be room for a very considerable expansion.

4. Prices for fibre are high. The districts in Russia, Belgium, and France where flax for fibre is grown most extensively are being devastated by the present great war. In some cases a large percentage of the men and other labourers formerly engaged in this industry have been killed or scattered. It is probable, therefore, that it will be some years before prices will be materially lower. It would on this account seem an opportune moment to encourage expansion in this industry in Canada.

5. The peculiar character of the industry, in that it affords opportunities for gain to both farmers and artisans and to labouring men, women and children (for the last three as well as for the first under very healthful conditions), would seem to make it an industry well worthy of every effort on the part of any Government to foster and encourage.

6. Another peculiar feature of the industry that it might employ a considerable number of labourers of all kinds in small centres close together which would not compete but rather help each other by their actual co-existence in a country seems to me most insistent of consideration.

7. The sources of profit from the crop are:—

(*a*) Seed (cattle feed, oil).

(*b*) Fibre for textile or cord-making purposes.

(*c*) Tow for upholstering purposes.

(*d*) Coarse broken straw for packing and cheap upholstering.

(*e*) Chaff for cattle feed.

(*f*) Ligneous residues for fertilizer or possibly other purposes, as bedding in stables.

8. The production of this crop would seem to be indicated over the vast clay belt in northern Ontario and northern Quebec along the line of the Transcontinental railway, where soil and climatic conditions are probably favourable, as well as in western Ontario and over certain parts of southern Quebec.

Since writing the above sentence I have visited northern Ontario, and on the line of the Transcontinental at Ground Hog river (Fauquier) I saw a field of excellent flax sown in June and just about ready to pull September 24.

RECOMMENDATIONS.

After reviewing what I have seen, the information I have collected, and my interviews with different men interested in this industry, I would like to make a few recommendations along two lines.

For Immediate Results.

I. Recommendations as to lines of effort likely to help the industry at the present juncture.

(*a*) The urging upon producers of the importance of grading their product and, if possible, the assisting of them along this line. To do this it might be possible to bring over two or three experts from Ireland or from among the Belgian refugees in England.

(*b*) The preparation and circulation of a brief pamphlet setting forth the possibilities of the industry and indicating the methods most likely to ensure profitable production.

(*c*) The undertaking of a series of meetings during the coming winter in those parts of Ontario where the industry is already established. Such meetings should have for object the impressing upon farmers and growers of the necessity for better methods of producing and better seed. An effort should be made also at such meetings to show that flax is not a crop extraordinarily exhaustive of soil fertility.

For Permanent Work.

II. Recommendations as to work that should be undertaken by the Government with a view to helping the industry in the near future and to putting it on a stable basis in such parts of Canada as may be found suitable as to soil, water, and climatic conditions.

(1) The establishing of a subdivision for fibre research work as a part of the Experimental Farm Branch.

(2) The exhaustive trying out of varieties of flax and methods of cultivation on our various Experimental Farms in Canada and in addition at, say, three or four points in the present flax growing districts of Ontario and possibly at two or three points in Quebec where flax is likely to be successful.

(3) The establishment on the Experimental Farm at Ottawa of a small but complete plant for all the operations in connection with the production of fibre from flax. Building, machinery and equipment would cost probably $8,000 or $9,000.

(4) The securing of a practical man such as Robinson now employed by Fraleigh as a foreman in charge of the work here.

(5) The employment of a young man with an Agricultural College training and an inclination toward this industry to go into the thing and make a thorough study of the practical side of the business for two or three years by performing all the actual operations until he could act as an expert in judging growing crops of flax for fibre, in harvesting, in retting, in scutching, in sorting and grading, in baling, in hackling, and in judging fibre. This man, when adjudged to have attained a sufficient degree of efficiency, should be placed at the head of the work with fibre either as a chief officer or as a sub-officer of the Division of Botany, probably the former.

(6) The appointment of a temporary officer in the outside service attached to the Experimental Farms who would take charge of the work outlined, under first heading, and who might later develop into a useful man for outside work in this connection.

(7) The continuation and expansion of the breeding work and selection work with flax now being carried on at the Central Experimental Farm.

Experimental Farm,
Ottawa, September 22, 1915.

CORRESPONDENCE.

Below are given the total numbers of letters received and sent from the various Divisions at the Central Farm and from the branch Experimental Farms and Stations. The large increase in letters received at the Central Farm is principally made up of applications for publications and to be placed on our mailing list, received by the Division of Extension and Publicity.

A satisfactory increase is also to be noted in the number of letters sent, showing a widening of the interest in the work of the Farms.

The number of reports, bulletins, and circulars sent from the Central Farm represents only a very small fraction of the Experimental Farm publications sent out, as the main distribution of these is made by the Publications Branch of the department.

CENTRAL EXPERIMENTAL FARM.

Division.	Letters Received.	Letters Sent.
Director	20,337	13,183
Field husbandry	1,410	1,280
Chemistry	4,519	3,821
Horticulture	7,249	9,007
Cereals	10,159	3,063
Botany	3,143	3,549
Animal husbandry	4,761	6,930
Agrostology	1,019	1,446
Poultry	5,389	7,789
Tobacco	3,692	2,392
French correspondent	7,392	6,013
Apiary	1,065	1,357
Extension and publicity	46,023	5,848
Illustration stations	1,542	2,443
Miscellaneous	10,897	3,673
	128,597	71,794

REPORTS, BULLETINS AND CIRCULARS.

Reports and bulletins mailed	68,779
Circulars	198,616

BRANCH FARMS AND STATIONS.

Charlottetown	1,135	1,357
Fredericton	1,338	1,369
Nappan	2,077	2,265
Kentville	2,394	2,428
Ste. Anne	1,538	1,887
Cap Rouge	2,813	3,608
Lennoxville	1,551	2,030
Brandon	3,838	7,564
Indian Head	7,813	7,738
Rosthern	2,919	2,653
Scott	1,843	1,860
Lethbridge	4,646	4,781
Lacombe	4,125	3,791
Summerland	896	859
Agassiz	4,973	5,120
Invermere	606	538
Sidney	1,196	1,329
Totals	45,701	51,177

These totals are exclusive of printed matter sent out.

The total number of letters received at all points in the Farms system will be seen to be 174,298, while 122,971 were sent out.

DISTRIBUTION OF SAMPLES.

The usual distribution of samples of seed grain and potatoes was carried on, although, owing to the loss by fire of the cereal building at the Central Farm, the distribution of grain was somewhat restricted. From Ottawa, 4,880 samples were sent out. From the branch Farms the following numbers of potato samples were mailed to applicants:—

Charlottetown	12
Fredericton	79
Nappan	300
Kentville	229
Cap Rouge	180
Indian Head	2,170
Rosthern	844
Scott	530
Lethbridge	1,155
Lacombe	435
Agassiz	720

The total distribution from the Central and branch Farms was 11,534 samples.

Some special distributions were also made, such as tobacco seed, from the Central Farm; trees, shrubs, and tree seeds from the prairie Farms; and sweet corn, vegetable, and flower seeds from the Station at Cap Rouge, Que.

MEETINGS AND JOURNEYS DURING THE YEAR.

As Director I found it necessary to do a great deal of travelling during the year, being obliged to visit both the Eastern and Western Farms and Stations twice. I also made two visits to the internment camps at Kapuskasing in Northern Ontario and at Spirit lake in Quebec. I also visited Washington, Philadelphia, Chicago, and several Michigan points on flax investigation work. I found it difficult to attend a great many farmers' meetings, but managed to address a considerable number, among which were the Eastern Ontario Dairymen's Association, at Renfrew; the Maritime Provinces Fat Stock and Poultry Show at Amherst; and a number of meetings in the Thrift and Production campaign.

PUBLICATIONS ISSUED.

During the year ending March 31, 1916, the following publications have been sent to press:—

The Annual Report of the Experimental Farms for the year 1914-15.

Bulletins, Regular Series:—

No. 86. The Cultivation and Improvement of the Apple in Canada, by the Dominion Horticulturist, W. T. Macoun. This is a revised and enlarged edition of the previous bulletin on the subject.

In the Second Series the following have been issued: —

No. 24, Plant Diseases of Southern Ontario, by W. A. McCubbin, M.A., Assistant in Charge of the Plant Pathological Laboratory at St. Catharines.

No. 25, Tobacco Growing in Canada, by Charlan, Tobacco Husbandman.

No. 26, Bees and How to Keep Them, by F. W. L. Sladen, Apiarist of the Experimental Farms.

Circulars:—

No. 10, Late Blight and Rot of Potatoes, by Paul A. Murphy, Assistant in Charge of the Plant Pathological Laboratory at Charlottetown, P.E.I.

No. 11, The Black Leg Disease of Potatoes, by the same author.

Pamphlets:—

A revised edition of No. 5, on Asparagus, Celery and Onion Culture.

Exhibition Circulars:—

The favour with which the first editions of these circulars were received last year, both in connection with the exhibition work, and in serving as concise yet complete

replies to inquiries from correspondents, has led to the bringing out of revised editions this year, and also to the issuing of a number of additional circulars on various topics. A list of these will be found in the report from the Division of Extension and Publicity.

"Seasonable Hints," Nos. 2, 3 and 4 have been brought out and distributed during the year. This pamphlet has proved very popular, and larger editions have been steadily required to meet the demand. The publication will be continued during the coming year.

ADDITIONS TO AND CHANGES IN THE STAFF.

The war has continued to draw upon the staff, both at the Central and Branch Farms.

It is felt that the names of those who have enlisted for overseas service should be recorded. From the outbreak of the war until March 31, 1916, the following have gone on active service. Where the person named is a reservist who rejoined his unit when called, this is noted.

ENLISTMENTS.

Allaway, J.
Arden, J. A. P.
Armstrong, V.
Atkinson, R.
Bartholomew, V
Bennett, J.
Bergot, E.
Boates, H.
Boston, J. W. (reservist).
Browne, L. A.
Brydon, J. D.
Chesley, E.
Cole, D. S.
Corner, J.
Craig, E.
Craig, J.
Curzon, J.
Donaldson, R. B.
Donaldson, R. I.
Dorgans, G. (reservist)
Drayton, F. L.
Dreher, C. F. W.
Dyer, W. H.
Estabrooks, W. H.
Everest, R. E.
Ferris, C.
Gallaher, J.
Godfrey, W.
Godfrey, W. B.
Golder, J. H.
Gordon, W. A.
Haddrell, C. W.
Hall, L. J.
Harrison, C.
Hazen, F. H.
Hesselwood, H.
Hobden, R.
Holmden, R.
Hubbard, G. A.
Huestis, H. W.
Humbert, P. (reservist).
Janson, J. T.
Jaquemet, F.
Johnson, L. I.
Joudoin, D.
Kennedy, G. N.
Lindesay, H. H.
Longworth, F.
Lothian, D. E.
Mackintosh, J.
MacLeod, J. S.
Marshall, C. A.
Mason, E.
Matthews, A. E.
McCool, P.
McCormack, V.
McDonald, J. (Agassiz).
McDonald, J. (Nappan).
McKay, G.
McKenzie, G. F.
McNeill, A.
Mynott, A. F.
Naper, F. C.
Neal, C.
Nichols, R. W.
Nicholson, A. V.
Neeley, H.
Neilson, M. A.
Nelson, E. E.
North, S.
Pennington, A.
Peters, S.
Peterson, P.
Peterson, A.
Pollock, W.
Pringle, E. H.
Rennie, J.
Robertson, D.
Robinson, M.
Rutledge, W.
Sansom, E. N.
Sculthorp, H.
Sheldon, A. (reservist).
Small, R.
Smart, R. (reservist).
Smith, C.
Smith, H.
Struthers, A.
Sutton, S.
Sweatmen, E.
Taylor, J.
Thornthwaite, H.
Tulley, H.
Valiant, S. H. (reservist).
Walker, A.
Walker, J.
Walton, H. A.
Webster, L. F.
White, O. C.
White, W. R.
Williams, C. M.
Wisdom, C.
Wood, J.

Temporary appointments have been made to fill the positions of some of these men.

In addition to the above war changes, the following appointments have been made:

H. A. Freeman, Inspector, Tobacco Division.

D. D. Digges, Manager, Tobacco Station, Harrow, Ontario.

G. C. Routt, formerly Manager of the Harrow Tobacco Station, to be Inspector and Plant Pathologist in the Tobacco Division.

J. F. Mackay, Assistant Chemist; appointed April 6, resigned August 20.

B. Leslie Emslie, C.D.A., F.C.S., Assistant Chemist, in charge of fertilizer experimental work.

R. L. Dorrance, B.A., Assistant Chemist.

Paul A. Murphy, B.A., A.R.C.S., Assistant in charge of Plant Pathological Station, Charlottetown, P.E.I.

G. C. Cunningham, B.S.A., Assistant in Charge of Plant Pathological Station, Fredericton, N.B.

Branch Farms:—

S. J. Bjarnason, B.A., B.S.A., Assistant to the Superintendent at the Experimental Farm, Brandon, Man., transferred to Morden, Man., March 20.

R. L. Ramsay, B.S.A., Assistant to the Superintendent, Experimental Farm, Agassiz, B.C.

R. I. Irwin, B.S.A., Inspector of Western Illustration Stations.

EXPERIMENTAL WORK AT FORT VERMILION, ALBERTA.

The winter of 1914-15 was a very mild one at Fort Vermilion, and fruit trees and bushes, strawberry beds, alfalfa plots, and ornamental plantations suffered no winter injury.

Snow had practically gone by the end of March, and ploughing commenced on April 10. Some wheat was sown on April 12 in the Fort Vermilion district, and seeding on the Experimental Station commenced on the 15th, continuing until finished without interruption from unfavourable weather. Germination was rapid owing to warm weather with sufficient rainfall.

May and early June were ideal growing months, but on June 14 there was a severe frost which seriously injured garden crops, flowers, currants, and alfalfa. Potato vines were frozen to the ground, but afterwards made new growth, and the crop was a normal one, though later than usual.

The latter part of June and the first half of July were hot and dry. The latter part of July and early August gave ideal weather for ripening grain crops. Success barley was cut on July 29, and all varieties of this grain gave good yields. Oat harvest began on August 3, and gave fair yields. Wheat was an average crop, the first variety, Bishop, being cut on August 15.

The hay crop in the Fort Vermilion district was a light one. The second cutting of alfalfa on the Station gave a good yield.

Potatoes were a fair crop, and roots a good one.

Flowers made a beautiful showing throughout the season, and the ornamental trees and shrubs made good growth.

Of nine varieties of wheat tested, the highest yielding, Preston, gave 62 bushels per acre, and the lowest, Stanley, 24 bushels per acre.

Five varieties of oats were grown. The yields were somewhat below the average. Banner was the highest yielding variety, with 96 bushels 4 pounds per acre, and Improved Ligowo the lowest, with 64 bushels 2 pounds.

Seven sorts of barley were tested, Claude, six-row, leading in yield with 71 bushels, 40 pounds, and Canadian Thorpe, two-row, the lowest, with 46 bushels, 30 pounds per acre.

Arthur and Prussian Blue peas gave 43 bushels and 39 bushels per acre, respectively.

Five varieties of Indian corn for ensilage were tried. The Compton's Early gave the highest yield of green fodder, 70 tons 1,420 pounds per acre, with Angel of Midnight the lowest, 2 tons 560 pounds.

Mangels, three sorts of which were tested, yielded from 23 tons to 18 tons per acre; field carrots, four varieties, from 27 tons to 18 tons per acre.

Two varieties of sugar beets gave yields of 16 tons 1,900 pounds and 17 tons 800 pounds respectively.

Five varieties of turnips ranged from 24 tons 1,500 pounds to 16 tons 1,600 pounds in yield per acre.

Five sorts of potatoes were grown with a high yield of 365 bushels and a low one of 297 bushels 50 pounds per acre.

Despite the frost of June 14, and the dry weather which followed, most vegetables gave satisfactory yields. Among those grown successfully were asparagus, rhubarb, onions, table beets, carrots, parsnips, parsley, lettuce, radishes, celery, cauliflowers, and cabbage. Tomatoes were practically destroyed by the frost.

In alfalfa, two plots, Ontario Variegated and Grimm's, have withstood two winters successfully, but the June frost destroyed the hope of obtaining seed from them in 1915. Other plots have come through one winter without serious winter-killing. The two-year-old plots of Grimm's alfalfa yielded at the rate of 4 tons 1,180 pounds per acre in 1915, and the Ontario Variegated at the rate of 3 tons 1,620 pounds. Other varieties tried give very satisfactory yields also.

TABLE OF METEOROLOGICAL OBSERVATIONS taken at Fort Vermilion, Peace River District, Alberta, from April 1, 1915, to March 31, 1916, showing maximum, minimum, and mean temperature, the highest and lowest for each month with date of occurrence, also rainfall, snowfall, and total precipitation.

Months.	Maximum.	Minimum.	Range.	Mean.	Highest.	Date.	Lowest.	Date.	Rainfall.	Snowfall.	Total Precipitation.	Number of days Precipitation.	Heaviest in 24 hours.	Date.
	°	°	°	°	°		°		In.	In.	In.		In.	
April.....	58·91	27·32	31·59	43·11	69·0	13th....	15·9	1st.....	1·20	.....	1·20	5	0·51	8th.
May.....	62·33	34·55	27·78	48·44	77·0	26th....	24·0	13th....	2·19	.....	2·19	5	1·81	29th....
June.....	68·66	36·41	32·24	52·53	82·5	26th....	17·9	15th....	1·08	.....	1·08	3	0·81	3rd.
July.....	74·73	43·64	31·09	59·18	84·5	7th....	31·5	3rd....	1·60	.....	1·60	8	0·56	22nd.
August....	78·77	44·60	34·17	61·68	92·0	12th....	37·0	25th....	1·16	.....	1·16	5	0·74	31st.
Sept.....	57·07	29·00	28·07	43·03	78·0	4th....	14·9	18th....	0·38	.....	0·38	4	0·17	22nd.
Oct.....	41·04	18·42	22·61	29·72	70·5	17th....	−0·0	30th....	0·55	7·50	1·30	6	0·50	5th....
Nov.....	16·90	− 7·49	24·26	4·64	34·0	5th....	−28·0	9th 21st.	.....	3·75	0·37	3	0·17	16th.
Dec.....	11·01	−13·57	24·61	− 1·27	34·0	4th....	−38·0	16th....	.....	8·25	0·82	5	0·50	9th....
Jan.....	−11·45	−36·25	24·79	−23·86	21·0	17th....	−65·0	10th....	.....	9·00	0·90	7	0·30	21st.
Feb.....	13·55	−15 80	29·70	− 0·95	41·0	25th....	−57·0	10th....	.....	0·25	0·02	1	0·02	22nd.
March....	13·27	−13·73	27·01	− 0·23	50·5	28th....	−38·0	3rd&7th	.....	12·50	1·23	9	0·47	28th.
	.....	.....	.....	.....	....	.....	.....	.....	8·16	41·25	12·25	61	....	.....

SOME WEATHER OBSERVATIONS taken at Central Experimental Farm, Ottawa, as compared with those taken at Fort Vermilion, Peace River District, Alberta.

	Mean Temperature.	Highest Temperature.	Lowest Temperature.	Total Precipitation.	Heaviest in 24 hours.	Total hours Sunshine.	Average Sunshine per day.
	°	°	°				
April.							
Ottawa	49·68	87·2	25·0	0·99	0·44	209·4	6·98
Fort Vermilion	43·11	69·0	15·9	1·20	0·51	222·9	7·43
May.							
Ottawa	51·83	78·6	31·8	1·86	0·31	229·5	7·40
Fort Vermilion	48·44	77·0	24·0	2·19	1·81	254·0	8·19
June.							
Ottawa	64·93	90·1	46·2	2·94	1·23	301·2	10·04
Fort Vermilion	52·53	82·5	17·9	1·08	0·81	357·2	11·40
July.							
Ottawa	68·74	92·0	50·0	2·12	1·08	282·6	9·11
Fort Vermilion	59·18	84·5	31·5	1·60	0·56	326·7	10·53
August.							
Ottawa	64·49	86·0	38·0	7·09	1·82	182·4	5·88
Fort Vermilion	61·68	92·0	37·0	1·16	0·74	305·0	9·83
September.							
Ottawa	61·07	88·7	35·0	2·87	0·69	217·2	7·24
Fort Vermilion	43·03	78·0	14·9	0·38	0·17	173·0	5·76
October.							
Ottawa	49·16	72·4	26·6	1·30	0·53	153·1	4·93
Fort Vermilion	29·72	70·5	−0·0	1·30	0·50	97·5	3·14
November.							
Ottawa	35·12	60·8	14·0	1·16	0·44	88·2	2·94
Fort Vermilion	4·64	34·0	−28·0	0·37	0·17	89·7	2·99
December.							
Ottawa	20·66	37·0	− 8·2	4·21	0·84	64·2	2·07
Fort Vermilion	− 1·27	34·0	−38·0	0·82	0·50	60·5	1·95
January.							
Ottawa	16·84	42·0	−16·0	4·19	0·70	87·4	2·81
Fort Vermilon	−23·86	21·0	−65·0	0·90	0·30	83·4	2·69
Ottawa	11·60	41·0	−19·4	4·25	1·10	114·4	5·94
Fort Vermilion	− 0·95	41·0	−57·0	0·02	0·02	161·2	5·55
February.							
Ottawa	17·36	52·0	−17·2	2·67	0·95	186·3	6·33
Fort Vermilion	− 0·23	50·5	−38·0	1·23	0·47	156·5	5·04

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RECORD OF SUNSHINE at Fort Vermilion, Peace River District, Alberta, from April 1, 1915, to March 31, 1916.

Months.	Number of days with Sunshine.	Number of days without Sunshine.	Total hours Sunshine.	Average Sunshine per day.
April	28	2	222·9	7·43
May	25	6	254·0	8·19
June	30	0	357·2	11·90
July	28	3	326·7	10·53
August	28	3	305·0	9·83
September	27	3	173·0	5·76
October	20	11	97·5	3·14
November	22	8	89·7	2·99
December	17	14	60·5	1·95
January	20	11	83·4	2·69
February	27	2	161·2	5·55
March	23	8	156·5	5·04

WILLIAM T. ELLIS,
Observer.

EXPERIMENTS AT FORTS SMITH, RESOLUTION, AND PROVIDENCE, NORTHWEST TERRITORIES.

In 1914 experimental work was carried on at the St. Bruno farm, about 20 miles from Fort Smith. In 1915 the work at Fort Smith was resumed, and trials of varieties were made at both points. It is proposed to combine the experiments in 1916 at both farms, as the character of the soil at each is markedly different.

The growing season of 1915 was most unfavourable in the Fort Smith district. Snow disappeared early, but a drought soon commenced, lasting for a great part of the summer. Three heavy frosts, coming at a time when the prospects of garden crops were good, destroyed practically everything.

The soil was ready early in May, and seeding was finished by the 20th.

Garden beets, carrots, onions, turnips, potatoes, and cabbages were sown at St. Bruno and Fort Smith, while the varieties of wheat, oats, and barley were tested at St. Bruno only this year.

Growth in early June was vigorous, but about the middle of the month a severe frost cut down the young growth, and recovery was slow. The turnips and cabbage were not so severely affected.

About the end of July, when a fair recovery had been made and there seemed again some prospect of a crop, a second and more severe frost destroyed everything except the turnips, carrots, onions, and beets. A fair crop was harvested from these.

At St. Bruno the frosts were heavier, and all garden crops were destroyed. The wheat, oats, and barley were harvested, however, and samples of fair quality have been received at Ottawa.

FORT RESOLUTION.

The results from the 1915 experiments at Fort Resolution were very satisfactory. The potato crop was somewhat lower than in 1914, owing to the seed potatoes not having been properly stored for winter. Parsnips failed, owing to poor seed. With these two exceptions the crop returns were uniformly good.

Spring opened very early, and work on the land commenced the middle of May. Seeding was finished by the 26th. The first half of June was cold and wet, and germination and growth were slow.

From July 10 to 22, the weather was dry and very hot. A good rain on the latter date was just in time to save vegetation. Frequent showers after that date kept up growth until harvest time. The first sharp fall frost was on September 9.

Four varieties of oats were tested. All ripened and gave good yields. The barley and wheat land was late in being got ready, and these grains did not ripen, although their growth was vigorous.

Potatoes gave a good crop, with no damage from frost.

Cherry, apple, and plum trees made good growth, and strawberry plants yielded a good quantity of fruit. Flowers and ornamental trees did well throughout the season.

EXPERIMENTS AT FORT PROVIDENCE.

Seeding was finished early, and in spite of the dry season and the frosts of June 12 and 13, everything tested except turnips gave good yields. Wheat (2 varieties), oats (2 varieties), barley (2 varieties), and peas (4 varieties) ripened grain of good quality.

EXPERIMENTS AT GROUARD, ALBERTA.

The spring of 1915 opened early at Grouard, and seeding was done by April 25. Germination was rapid and subsequent growth steady, with no set-back from frosts. Dry weather set in about July 15, but this did not affect the grain yield to any extent, although the yield of straw was somewhat lessened thereby. All grain except Victory oats was ripe and cut by August 21. Marquis wheat yielded 26¼ bushels per acre, Ligowo oats 46 bushels 36 pounds.

Swedes, forage beets, and field carrots gave good crops.

Vegetables, such as cabbage, celery, peas, beets, lettuce, onions, and carrots yielded well. Potatoes, three varieties of which were tested, averaged 225 bushels per acre.

The flower garden was, as usual, most successful.

Gooseberries and strawberries were both good crops.

EXPERIMENTS AT BEAVERLODGE, ALTA.

Experimental work at this point was carried on by Mr. W. D. Albright, whose training in agriculture and deep interest in the work have rendered the results obtained most valuable.

The soil was very dry when spring opened. Some seeding was done in the latter part of March, but most of it in April. Growth was slow for a time, and later-sown fields ploughed in the spring instead of the previous fall, gave better crops.

June was rather dry, but good rainfall in July and frequent showers thereafter with warm weather gave favourable growing conditions.

Frosts did very little damage.

Four varieties of wheat were tried, the lowest, Prelude, giving 26 bushels per acre, and the highest, Huron, 68 bushels.

Banner oats gave the highest yield of 111 bushels per acre, and Manchurian the highest among the barleys, with 42 bushels 24 pounds per acre.

Plots of Western rye grass, timothy, red clover, and alfalfa, were sown. Cutworms destroyed the last two, which were reseeded. Growth was good on all these plots.

A plot of timothy and one of red clover, both sown in 1914, wintered perfectly and gave good yields of hay in 1915. The second growth of clover ripened a good crop of first-class seed.

Alfalfa, sown in 1914, and closely grazed and trampled down that fall, wintered well and was left for seed in 1915. Seed was formed in abundance, but only a small proportion matured.

Field roots were only a fair crop.

The results with garden vegetables were on the whole very good.

Out of fifty seedlings each of Manitoba maple and caragana, forty of each grew vigorously.

TABLE of Meteorological Observations taken at Beaverlodge, Alberta, from August 14, 1915, to March 31, 1916, giving the maximum, minimum, and mean temperature for each month, also, rainfall, snowfall, and total precipitation.

Months.	Maximum.	Minimum.	Range.	Mean.	Highest.	Date.	Lowest.	Date.	Rainfall.	Snowfall.	Total Precipitation.	Number of days Precipitation.	Heaviest in 24 hours.	Date.
	°	°	°	°	°		°		In.	In.	In.			
August	73·05	48·53	24·52	60·79	82·0	15th....	38·5	31st....	0·81	.....	0·81	3	0·58	19th.
September	57·55	34·98	22·57	45·26	76·0	3rd....	16·0	12th....	0·88	1·50	1·03	9	0·33	18th.
October	45·87	25·66	20·20	35·76	69·0	15th....	9·5	22nd & 23rd.	1·29	.....	1·29	10	0·28	27th.
November	29·16	12·78	16·38	20·97	48·0	4th....	− 4·5	10th....	0·18	.....	0·18	5	0·11	18th.
December	25·51	10·21	15·30	17·86	41·0	2nd....	−10·5	10th....	....	5·00	0·50	....	....	
January	− 4·91	−23·70	18·79	−14·31	26·0	5th & 18th.	−48·5	10th....	....	7·00	0·70	....	....	
February	25·96	5·79	20·17	15·87	55·0	19th....	−33·0	5th....	....	3·00	0·30	2	0·20	10th.
March	28·41	6·32	22·09	17·36	49·0	11th....	−19·0	2nd....	....	12·25	1·21	10	0·40	13th.
	.....	.....	.....	.....	....	.....	.....	.....	3·16	28·75	6·03	39	....	

No dates given on which snow fell in December, but there were 5·00 inches on the ground on the 31st of the month.

No dates given on which snow fell in January, but the amount on the ground on the 31st of the month was 7·00 inches.

WILLIAM T. ELLIS,
Observer.

EXPERIMENTS AT MINTO BRIDGE, YUKON TERRITORY.

Some experimental work was begun at this point. Owing to transportation difficulties, much of the seed sent arrived too late for use last spring. Remarkable success was attained in ripening barley, oats, and spring rye. The barley yielded at the rate of about 40 bushels per acre, the oats (Eighty Day) 40 bushels, and the spring rye some 35 bushels per acre.

It is hoped to extend the scope of the work here the coming season, and to devote some special attention to the question of forage plants suitable to this northern region.

EXPERIMENTS AT SALMON ARM, B.C.

The work was conducted as heretofore by Mr. Thos. A. Sharpe.

There was a fairly heavy snowfall in the winter of 1914-15, and there being little frost in the ground the water was nearly all absorbed in the spring. Precipitation, during the growing season, was ample for good growth.

Hay and grain crops were fully up to the average. Oats yielded 70 bushels per acre, and potatoes nearly 370 bushels.

The fruit crop was a fairly good one, and prices satisfactory.

METEOROLOGICAL Record for the Year ending March 31, 1916, taken at Experimental Station, Salmon Arm, B.C.

Month.	Temperature.				Precipitation.		Sunshine.
	Highest.	Date.	Lowest.	Date.	Rainfall.	Snow.	
1915.	°		°				H. M.
April	76	16–28	29	21	1·93	.....	195·24
May	81	8	34	1	3·56	.....	200·00
June	85	23	38	7	2·55	.....	223·42
July	86	20	45	11	2·61	.....	271·42
August	94	15	45	30	·50	.....	318·48
September	84	4	31	10	·73	.....	158·12
October	65	2–22	28	6	1·32	.....	116·36
November	50	4	13	12	·14	7¼	55·30
December	49	6	− 7	29	1·05	19½	42·54
1916.							
January	25	8–21	−31	10	.....	8½	95·18
February	47	17	−25	2	1·13	16	95·30
March	54	19–29	.....	.....	1·53	2	93·54
Totals	.....	.....	.....	.....	17·05	53¼	1,967·30

DIVISION OF CHEMISTRY.

Much difficulty has been experienced in replacing the assistant chemists who have enlisted for active service overseas, by temporary employees, and in consequence this Division has been handicapped in the performance of its duties during the past year. The extraordinary demand for chemists for munition works and other industries connected with the war has reduced the number of available chemists that would be qualified to undertake the work in this Division. However, with the reduced staff, every effort has been made to cope with the situation, and much valuable work has been accomplished.

The correspondence of the Division, dealing largely with requests from farmers for analytical work and advice on their manifold soil, fertilizer, and feeding problems, continues to increase. During the year, 4,393 samples of materials for analysis were received as compared with 3,829 samples in the previous year. The larger proportion included samples of soils, fertilizers, feeding stuffs, spraying materials, etc., sent by farmers, but a considerable number was represented by samples submitted by the Meat Inspection Division, Health of Animals Branch. These samples, collected at various packing-houses in Canada, consisted chiefly of preserved meats, lards, colouring matters, preservatives, spices and condiments, and evaporated apples. The total number of these samples received during the past year was 1,180, as compared with 662 in the previous year. The Division has also done a large amount of analytical work in connection with the flours purchased in Canada for the British War Office.

Important progress has been made in the examination of soils from various irrigation tracts in Alberta, the chief object of the investigation being to ascertain the adaptability of these areas to farming under irrigation. This work has included especially the determination of the nature and amount of "alkali," where such has been discovered. The reports from this Division have proved of great assistance to the officers of the Department of the Interior in the reclassification of the areas under examination.

Considerable progress in the study of soil and climatic conditions in their influence on the composition of wheat has been made. Wheat from the same stock was sown on the Farms and Stations of the Experimental Farm system, and the harvested grain

analysed. This further work confirms our previous conclusion that seasonal conditions may profoundly modify the gluten content and hence the quality of the wheat for bread-making. The conditions most favourable to the production of a hard berry of prime quality seem to be a moderately dry soil and fairly high temperature during the period in which the kernel is filling out.

Sugar-beet investigations have again indicated that in many widely separated points of the Dominion, where soil and climatic conditions are suitable, beets with a high sugar-content may be satisfactorily produced. With the exception of Lacombe, Alta., and Rosthern, Sask., all the other branch Stations, where the investigation was undertaken, furnished suitable conditions for the production of sugar beets for factory purposes. This fact is particularly important at the present time, when so many inquiries are being received as to the possibilities of the sugar-beet industry in Canada.

In addition to the fertilizer experiments hitherto carried on at the branch Stations at Fredericton, N.B., Kentville, N.S., and Agassiz, B.C., a new scheme, on a much more elaborate and systematic scale, has been introduced at Agassiz, B.C., Cap Rouge, Que., Charlottetown, P.E.I., Fredericton, N.B., and Kentville, N.S., and provision has been made to extend the investigation to other branch Stations. This experiment is intended to embrace a three-year rotation, consisting of first year, potatoes (or other hoed crop); second year, grain; third year, hay, and the results of the three years will be considered in determining the most profitable fertilizer mixture—both in the quantity and proportion of its ingredients.

The results from the first year's crop are interesting and instructive and, particularly in studying the averages from Stations where potatoes were grown, a great degree of consistency appears.

Judging by the potato yields from this experiment in 1915 at Fredericton, N.B., some support would seem to have been gained for an argument in favour of the very heavy fertilizer applications which, in New Brunswick, the potato areas customarily receive.

At Kentville the plots receiving manure in addition to a moderate application of fertilizers have yielded the largest profits at this initial stage, a result which conforms to the generally accepted theory that fertilizers should be employed chiefly as an adjunct to manure, especially on a light soil, such as that on which the tests at Kentville were made.

The exclusion of the German potash salts, as a result of the war, prompted an investigation to discover the feasibility of preparing a nitro-potassic fertilizer by a process of drying and grinding Atlantic coast seaweeds. The investigation having been authorized by the Honourable Minister of Agriculture, the Naval Service Department kindly granted the use of the Dog-fish Reduction Works at Clarke's Harbour, N.S., where the experiments were conducted on a comparatively large scale during the spring and summer of 1915. During the brief period of factory operations, about 50 tons of the fertilizer were produced, and the material is now being employed in the conduct of numerous field tests, on the branch Stations and on many individual farms in the provinces of Nova Scotia, Prince Edward Island, New Brunswick, and Quebec, as well as at the Central Experimental Farm, Ottawa, to discover its fertilizing value.

The ever increasing demand for information on fertilizers and soils, and the widening scope of the experimental work in this Division, necessitated the appointment of expert assistance, the appointee being designated Supervisor, Investigational Work with Fertilizers. Besides the supervision of fertilizer experiments, his duties include attention to correspondence on the subject of fertilizers and soil amelioration generally.

There is abundant evidence of a widespread and growing interest in the question of "liming," and many sample of lime, limestone, and other lime compounds are sent for analysis by farmers and officers of Provincial Governments. The bulletin "Lime in Agriculture," issued by this Division, has proved very popular, and a large number has been distributed. Investigation has shown that limestone of excellent quality, suitable

for the preparation of ground limestone or for the production of quick-lime, by burning, occurs in many parts of Canada.

A large number of samples of fodders and feeding stuffs have been examined by this Division during the past year. These included varieties of mangels, turnips, and carrots grown at the Central and branch Experimental Farms and Stations, the object of the investigation being to determine their relative feeding value. The composition of field roots has been found to vary considerably, with different varieties. Valuable data have thus been obtained and a means indicated whereby the farmer may increase the feeding value of his root crops.

Much attention has been paid to the importance of alfalfa, clover, etc., both in respect to their high protein content and to their beneficial influence on the soil. Instructions have been issued also on the valuation (based on their analyses) of commercial concentrated feeding stuffs. Analyses have also been made of prairie hays collected in Western Canada.

The precipitation of rain and snow at Ottawa (Central Experimental Farm) during the past experimental year (from March 1, 1915, to February 29, 1916), was, respectively, 23·13 and 105·25 inches. The unusually heavy snowfall contributes largely to the exceptionally high total nitrogen content of these sources, viz., 9·765 pounds per acre, as compared with the average for the previous eight years, viz., 6·396 pounds per acre.

The examination of well waters from farm homesteads continues an important branch of this Division's activities. It is gratifying to note the increasing interest by farmers in this vital question. Much however, yet remains to be done in impressing upon our farmers the importance of a pure water supply, both for household and stock use.

DIVISION OF FIELD HUSBANDRY.

The operations of the Field Husbandry Division are very practical in nature and may be summarized under the following heads: (1) Soil management; (2) Crop management; (3) Agricultural engineering.

The foregoing lines of work are being conducted at the several branch Experimental Farms and Stations. The work at the Central Farm, Ottawa, is limited, due to the fact that suitable land is not available for carrying on experimental tests that should naturally be included. Although hampered in this manner, the following experimental work was conducted during the year at this Farm.

WEATHER CONDITIONS AND CROP YIELDS.

The season of 1915 was characterized by an early seeding and a wet harvest. Spring seeding was in progress on April 21, and was continued uninterruptedly until finished on the 29th of April. The temperatures, lower than usual during the month of May, retarded the growth of grain which had made a promising start. Corn planting, too, was delayed, on account of the cool weather, until the end of the month. The forepart of June was dry, and during the month the first cut of hay was taken. In July corn, roots, and grain made good growth but the latter was harvested with difficulty in August, when the heaviest rainfall in years for that month was recorded. On September 26 severe winds damaged the corn crop, making the harvest tedious, more especially where the corn was allowed to grow too thickly. The weather continued fine throughout the month of October, providing a favourable opportunity for the harvesting of roots and potatoes and the finishing of autumn ploughing.

COST OF PRODUCTION OF FIELD CROPS.

The following figures represent the cost of production of field crops for the season of 1915. The crops for which costs have been determined include roots, corn, oats, and hay.

Cost of Production of Field Crops, Central Farm, 1915.

Crop.	Area.	Yield per Acre.		Cost to Produce.		
		Tons.	Bush.	Per acre.	Per ton.	Per bush.
	Acres.			$ cts.	$ cts.	Cents.
Mangels	1·00	21·87	729	33 90	1 55	4·65
Ensilage corn	32·3	16·58	.....	23 99	1 45	.....
Oats	38·5	.....	69·4	16 17	.....	19·39
Oat straw	38·5	1·19	.....	.....	2 28	.....
Hay	30·0	3·67	.....	18 38	5 00	.....

ROTATION OF CROPS.

The results of our experiments in this connection would indicate that in the management of crops the order in which they are grown is of great importance. There are now under test, at this Farm, for various purposes, fifteen rotations. For ordinary farm conditions any one of the following will likely prove satisfactory:—

Rotation "A" (five years' duration).—Hoed crop, manured; grain, seeded down with clovers and grass; clover hay, top dressed with manure in autumn; timothy hay, field ploughed in August, top worked and ribbed up in October, grain, seeded down with red clover to be ploughed under the following spring, when the succeeding hoed crop is corn.

Rotation "B" (five years' duration).—Hoed crop, manured; grain seeded down with clovers and grass, seeds top dressed with manure in autumn; clover hay, ploughed in autumn; grain seeded down with clovers and grass; clover hay.

Rotation "C" (four years' duration).—Hoed crop, manured; grain, seeded down with clover and grass; clover hay; timothy hay, field ploughed in August, top worked and ribbed up in October.

Rotation "D" (three years' duration).—Hoed crop, manured; grain, seeded down with clovers and grass; clover hay.

Soiling Crop, Rotation "R" (three years' duration).—Corn for early fall feed, manured; peas and oats to cut green, seeded down with clovers and grass; clover hay to cut green.

Some characteristics of the above rotations desirable under almost any conditions, are as follows:—

(1) Grain fields are always seeded down with clover, even though it be used only as a fertilizer, as in the case of the fifth year of rotation "A."

(2) Grass and clover seedings are heavy. Increased crops of hay and rare failures of a catch have justified them.

(3) Hoed crops form a large proportion of every rotation. An attempt to farm a small area without a hoed crop was not successful. Weeds could not readily be kept in check.

(4) No field is left in hay for more than two years. Our records show that the second crop almost always costs more than the first per ton, and that succeeding crops are very liable to be grown at a loss.

(5) Barnyard manure is applied frequently in comparatively small quantities, rather than at long intervals in large quantities.

The following record shows the comparison of the chief items in connection with these rotations:—

Cost, Returns and Net Profits of Rotations "A," "B," "C," "D," and "R," 1915.

Rotation.	Cost to operate per acre.	Value of returns per acre.	Profit per acre.
	$ cts.	$ cts.	$ cts.
A (five years' duration)	18 22	23 01	4 79
B (five years' duration)	17 78	18 75	0 97
C (four years' duration)	18 10	22 44	4 34
D (three years' duration)	20 44	23 47	3 03
R (three years' duration)	21 59	28 79	7 22

SHALLOW PLOUGHING AND SUBSOILING VERSUS DEEP PLOUGHING.

Two four years' rotations, differing only in the preparation of the sod area for roots or corn, as described above, are used in this experiment. The results of twelve years have failed to show any decided advantage in favour of either method. The figures for the past year were in favour of shallow ploughing and subsoiling. The average for the period of twelve years, however, is in favour of the deep-ploughing method. It will be necessary to continue this experiment for some time yet before definite conclusions can be drawn.

COMMERCIAL FERTILIZER AS A PART SUBSTITUTE FOR BARNYARD MANURE.

This experiment has been conducted for a period of seven years and is designed to supply information regarding the fertilizer merits of:—

1. No manure or fertilizer of any kind but pastured one year in four.
2. Barnyard manure.
3. Complete commercial fertilizer.
4. Barnyard manure, together with commercial fertilizer.

The results to date show a distinct advantage in barnyard manure alone over commercial fertilizer alone for this soil, but suggest the possibility of combining the two profitably when barnyard manure is scarce or high priced. Pasture alone does not maintain fertility sufficient for profitable crop production.

DIVISION OF ANIMAL HUSBANDRY.

The field of work for this Division, as in former years, includes directly the care, breeding, housing, and marketing of all classes of live stock and their products on the Central Experimental Farm, together with the testing of foodstuffs and methods in the care and management of stock and of machinery pertaining thereto. The scope of work also, in co-operation with the Farm superintendents, includes a general supervision of the live stock work on the branch Farms throughout Canada.

A very successful year may be reported for the live stock on the Central Experimental Farm. The conditions as to housing, feeding, and general management of the stock were superior to any of the past several years. The summer feeding work was most encouraging, due to the temporary rental of a pasture area and the excellent weather for the production of good pasture. This, coupled with a plentiful supply of ensilage remaining over from the previous winter, and with the generous quan-

tity of green feeds supplied by the Field Husbandry Division, maintained the milk flow of the cows and the growth of the young cattle as never before. The pasture areas, however, are still much too limited for progressive work with the sheep and swine.

There are now 519 head of live stock in the stables, made up as follows: 11 head of beef cattle, 166 head of dairy cattle, 29 head of horses, 142 sheep, and 171 swine. All the live stock have made a very good showing during the past year. The amount of experimental work—which is the prime consideration—was greater than in the previous year, and with even more gratifying results. In addition to this, the sales of dairy products amounted to $10,189.11; of breeding dairy cattle, $4,087.35; of sheep, mutton and wool, $1,697.46; and of swine for breeding purposes and for pork, $2,675.06. These sales, coupled with the increased values of the various herds and flocks, the value of manure, and the horse labour supplied to other Divisions, makes a sum total of $29,586.28, which is an excellent return from the live stock on a 200-acre farm.

HORSES.

The horses do all the labour connected with the various Divisions on this Farm. At present there are twenty-nine head of horses, which includes twenty-one draught horses, four expressers, and four drivers. The heavy draught horses include four imported Clydesdale mares, two Canadian-bred Clydesdale mares, and two grade Clydesdale mares. All the horses are in excellent condition. Breeding operations with horses have not been very successful on this Farm to date. During the early part of the year two mares lost their foals from the same apparent reason as in the previous year, namely, carrying overtime from four to six weeks, and the foals coming soft and lacking in vitality. However, two of the imported Clydesdale mares have recently dropped splendid filly foals, and another mare gives every promise of foaling normally. Conditions for experimental work along the lines of feeding, care and management of pregnant mares and foals are more promising for the future. One imported Clydesdale mare was lost from rupture of the diaphragm, the result of a very sudden and acute attack of flatulent colic.

The horse labour supplied to the various Divisions for the past year amounted to 7,494 days, which at the conservative valuation of 70 cents per day, gives a total return of $5,245.80.

Considerable experimental feeding with work horses has been conducted during the past year, this work being largely an accurate comparison of crushed *versus* whole grains for work horses.

Some details of this may be found in the report of the Dominion Animal Husbandman.

BEEF CATTLE.

During the early part of the year no beef cattle were maintained on this Farm, but later on grade Shorthorn calves were purchased with a view of obtaining further figures as to the production and marketing of baby beef.

DAIRY CATTLE.

The pure-bred dairy herds at the Central Farm are Ayrshire, French Canadian, Holstein and Jersey. All these herds have made a normal growth during the year, and have given satisfactory returns. It was considered advisable during the past year to dispose of the Guernsey herd, as this breed had been carried a sufficient length of time to obtain the relative standing with other herds for this district; moreover, the breed is not sufficiently popular to warrant the prominence it obtained in proportion to breeds of more importance in Central Canada. The number of pure-bred cattle of the four above-mentioned breeds is now 120 head.

The grading experiments with grade Ayrshires and grade Holsteins have been conducted with marked success, and the cows continue to give excellent returns. There are now forty-six grade cows and heifers in these two herds.

DAIRY CATTLE FEEDING EXPERIMENTS.

A number of new lines of dairy cattle feeding experimental work have been undertaken during the year. Some of the results of these are found in the detailed report of the Dominion Animal Husbandman. The three lines of work given greatest prominence were: first, an investigation into the most successful succulent roughages for summer feeding, largely a comparison of ensilage *versus* soiling crops; secondly, the study of the protein values of various concentrated meals on the markets, and the best rations containing these concentrates; and, thirdly, a continuation of the work of investigating the most economical methods of calf rearing, with and without whole milk, skim-milk, and other dairy by-products in conjunction with various calf meals.

MILKING MACHINES.

Another very successful year has been completed in the investigation of the commercial values of mechanical milkers. In addition to the two original machines, namely the Sharples and the Burrell-Lawrence-Kennedy, used for this investigation, there have been added the Empire, Lister, Omega, and Calf-way milkers. Although all this work is not being accurately checked bacteriologically, yet valuable data regarding the comparative commercial and pathological values of these machines are being gathered.

DAIRY COW RETURNS.

Again the quality of the dairy cattle on the Central Experimental Farm has shown marked improvement. The average profit per cow has again increased over $8 per annum. Particular attention is drawn to the fact that many of the best cows have not completed their lactation periods at the end of the fiscal year, hence the following table in itself is not a definite criterion as to the comparison of the breeds. Following is a brief summary showing the returns of some of the cows, the profits being based on the following valuations: Butter, 30 cents per pound; skim-milk, 20 cents per hundredweight; pasture, $1 per head per month; hay, $7 per ton; meal, $25 per ton; and other roughages at the usual cost prices. Attention is drawn to the marked increase in both production and profits of the best five animals in each breed, particularly in the case of the Holstein and Ayrshire herds. However, it is but fair to add that the herds of French Canadians and Jerseys were comparatively small, and only five animals in each completed a lactation period during the year.

No. of Head.	Age.	Breed.	Average Days in Milk.	Average Pounds Milk produced.	Average per cent Fat.	Average Profit over Feed between calvings (labour, manure and calf not included.)
	Years.		Days.	Lb.	p.c.	$
58	2 and over	All breeds and grades	338	8,236	4·18	76·89
5	2 "	Ayrshire	339	9,317	4·12	84·54
5	2 "	Canadian	322	8,111	4·51	83·41
5	4 "	Grade Ayrshire	371	8,515	4·13	78·82
5	3 "	Grade Holstein	398	11,822	3·77	102·49
5	2 "	Holstein	321	11,981	3·33	93·21
5	2 "	Jersey	324	7,263	5·29	95·80

Butter valued at 30 cents per pound is equivalent to milk at only $1.65 per hundred pounds, while in reality the manufacture of fancy cheeses sold in large quantities from this Farm realized $3 per hundredweight on the milk. However, the butter basis is fair for the comparison of the various breeds in these stables as well as with the average herds throughout Canada.

SHEEP.

Although the lack of pasture still is a great hindrance in the investigational work with sheep, yet this class of stock made a remarkable showing during the past year, due largely to the high market values of lamb, mutton, and wool. Breeding work on a small scale with Shropshires and Leicesters has been most successful. There are now 142 head of breeding stock in the pens. Aside from this, the feeding experiment with one hundred grade lambs, investigating the values of various grains for the finishing of lambs for the market, showed a reasonable margin of profit.

SWINE.

Considering the shortage of pasture, another very successful year is to be reported for swine husbandry on this Farm. At present there are 171 head of swine in the pens. Three breeds are maintained, namely, Yorkshires, Berkshires, and Tamworths. Many swine experts claim that there are at this Farm some of the finest breeding sows in Canada.

Several lines of investigational work in the feeding of swine have been conducted during the past year. Briefly these are: (1) the value of tankage and other foodstuffs as milk substitutes for young pigs during and after weaning; (2) the value of soiling crops for the summer feeding of shoats in the dry lot; (3) the most economical methods of feeding, comparing the hopper grinders and self-feeders with regular hand feeding; (4) the best rations for finishing shoats for the market and the comparative values of the protein contained in various concentrated meals for the feeding of market hogs.

BUILDING PLANS.

The Animal Husbandry Division has again during the past fiscal year finished the preparation of plans and brief specifications of live-stock buildings for the branch Farms. These plans have been, in turn, passed on to the Department of Public Works and have there been used as patterns for the completed plans used in the construction of these buildings.

Many plans and specifications of farm buildings have been sent free of charge to farmers throughout Canada. These plans illustrate the various economical types of farmer's barns best suited to their needs. In all 843 blueprints of live-stock buildings have been made and distributed. Many splendid barns of various sizes and types have been constructed after these plans, to the marked satisfaction of their owners.

MISCELLANEOUS.

The Dominion Animal Husbandman in attending to his duties outside of the Central Experimental Farm has officially visited at least once during the year all of the branch Experimental Farms in Canada where live-stock work is being conducted. He and his assistants have spent a great deal of time attending a large number of meetings in various parts of Canada, judging at numerous exhibitions, and studying live-stock conditions and the needs for experimental and demonstrational work relating to live-stock.

HORTICULTURAL DIVISION.

The main lines of work previously under way in the Horticultural Division were continued in 1915, and some additional work was started. The production of good vegetables in large quantities in Canada is very important, and during the past year, following a meeting of the superintendents of the branch Farms and Stations at Ottawa, an extensive series of experiments with vegetables was planned. In the past most of the experiments have been in variety testing, but as it had been pretty well established on most of the Farms which varieties were most suited for the different parts of Canada, the new experiments are mainly cultural and while the variety testing will be continued to compare the new sorts with the older ones, the cultural side of the work will receive more attention in future.

A few examples of the result of the experiments in vegetables for 1915 will show the importance of this work. In many places in Canada the season is not long enough to develop and ripen a crop of onions from seed, and even those grown from transplanted onions are not always a success. If onion sets are planted, however, there is almost certain to be a good crop, but these are expensive to buy. An experiment in producing onion sets at the branch Farms and Stations showed that, even in the rich soils of the prairie provinces, they can be produced of the best grade.

In certain parts of Canada the tomato crop is very uncertain, owing to cool nights in summer and early autumn frosts, and a large part of the crop is frequently still green when frost comes. Experiments in different methods of ripening these green tomatoes showed that the best method, and one by which a large proportion of these green fruits could be ripened, was by putting them in a closed box in a moderately warm temperature.

The use of the tar felt discs for protecting cabbage and cauliflower plants from the root maggot has been advocated by the Horticultural Division for many years, but a demonstration of their value, such as there was on many of the branch Farms and Stations in 1915, should cause many persons to use them. The desirability of planting varieties of beans and peas of different seasons on the same day rather than planting the same variety at different intervals was shown in another experiment. These are but a few of the interesting results of the tests made.

A number of irrigation systems have been established by growers in Canada for controlling the water supply in vegetable plantations, and as it was desirable that experimental evidence of their value should be obtained, an overhead system covering 7 acres was installed at the Central Farm in 1915. Details of this installation will be found in the report of the Dominion Horticulturist. The latter part of the season of 1915 was too wet to obtain any marked results from irrigating growing crops that year, but the value of having water readily available was demonstrated in a strawberry plantation, as there was a severe drought after the plants were set out and, no doubt, a large proportion of them would have died had they not been well watered. As the strawberry is one of the most profitable crops grown in Canada, this was quite important.

The development of new strains and varieties of early vegetables continues to be an important part of the work. Very favourable reports have been received of the results from seed sent to different parts of Canada for test. The Early Malcolm corn and Alacrity tomato, two of the strains developed at the Central Farm, are now offered for sale by seedsmen.

In 1915, experiments were conducted in growing vegetable seed of different kinds and good success was obtained with carrots, beets, celery, tomatoes, corn, peas, and other vegetables. There is no doubt but that a large proportion of the vegetable seed used in Canada could be produced in this country, but it might not be profitable to grow some kinds, and until as pure seed can be guaranteed as is obtained from the best seed growers in other countries, great progress cannot be made in growing seed for sale, but it is recommended that the private individual save seed for his own use and compare it with what he buys.

FRUITS.

The largest planting of fruits in 1915 was made at the Experimental Station, Lennoxville, Que., where 24 acres of fruits were set out, mainly of apples. On about 10 acres a series of cultural experiments with apples was planned, and the results from the different methods should prove very interesting and valuable to those desiring to grow apples where the winters are as severe as at Lennoxville. A very thorough test is being made for hardiness of the many new varieties of apples originated at the Central Experimental Farm. The fruits set out include apples, pears, plums, cherries, grapes, currants, gooseberries, raspberries, and strawberries. Some fruits were sent up to the internment camps at Kapuskasing, Ont., and Spirit lake, Que., in the autumn of 1915, in order that those which prove hardy may have become well established by the time the farms where these camps are situated are turned over to the Department of Agriculture.

The records of the experiments with fruits at the Central Farm become more valuable each year as additional data are obtained in regard to their relative merits and the various conditions under which they are growing. It is now possible to tell what trees of many varieties of apples are likely to yield if well cared for from the time of setting out until they are eighteen to twenty years planted. The crop of fruit at the Central Farm was a very fair one in 1915, notwithstanding the light crop in many places.

ORNAMENTAL PLANTS.

Considerable interest, as usual, was taken in ornamental plants in 1915, both at the Central Farm and at the branch Farms and Stations. Canadians appear to be taking more interest in the beautifying of their homes than they used to do, and the ornamental grounds throughout the Experimental Farms system are attracting the attention of many people. Good collections of trees, shrubs, and herbaceous plants have been brought together for test, and records kept of how they succeed, so that the people in the more newly-settled parts of Canada, particularly, can learn through the annual reports what things will be likely to succeed with them. There has ben a great demand for a bulletin on Rose Culture which was published during the year.

GREENHOUSES.

The work in the greenhouses during the past year has, it is believed, been of considerable value. Different kinds of vegetable crops were grown to learn the best methods of culture, and the best varieties, among the crops being grown being tomatoes, melons, cauliflowers, and beans. Tomatoes and lettuce are evidently two of the most profitable vegetable crops to grow, though a crop of melons in the summer months before the outside crop is ready is fairly remunerative. Grapes were grown very successfully in pots, and strawberries were forced; while apples, pears, and cherries were grown in pots for cross-breeding purposes. Among flowers a specialty was made of the chrysanthemum, and many persons visited the Central Farm especially to see them when they were in bloom.

DIVISION OF CEREALS.

THE SEASON.

Throughout the greater part of Canada the season of 1915 was remarkable for the high yield per acre of all cereals. The Maritime Provinces, however, did not share to a great extent in the abundant production of the middle and western provinces. A cold late spring with a super-abundant rainfall resulted in late seeding, many farmers not being able to sow their intended acreage of grain on this account. In the middle provinces seeding conditions were favourable, but in Ontario and western Quebec, harvest-

ing was accomplished with extreme difficulty. At the Central Farm heavy yields were spoilt by the continuous rainfall and warm weather, which was typical of prevailing conditions while harvesting was in progress throughout the province.

The large crop produced throughout the greater part of the West presents a striking contrast to the low production of 1914. The northern parts did not experience such ideal conditions as the more southern portions. At the Rosthern Station cold weather with a prolonged drought in the spring was experienced, while at Lacombe, though exceptional crops were harvested, heavy rains prevailed. British Columbia, with its extreme variations in climate, produced crops much above the average.

MARQUIS WHEAT AND OTHER NEW VARIETIES OF GRAIN.

Marquis wheat has again achieved international distinction by winning for the fifth successive time the world's championship in America. At the International Dry Farming Congress held at Denver, Colorado, last September, an exhibit by Mr. Seager Wheeler, of Rosthern, Sask., carried off this coveted honour. The repeated triumphs of this variety justify its universal popularity. In the Canadian West, with the exception of a few districts, it has largely replaced Red Fife, while increased areas in the northern states are being seeded to Marquis.

In those districts where the season is short, more Prelude wheat is being grown, as the settlers find that its early maturity is a safeguard against loss by frost. It is pleasing to record that it has figured among the awards of some of the western exhibitions. The more general use of this wheat in the northern sections will minimize loss to wheat growers in unfavourable seasons.

Arthur peas continue to attract most favourable attention—especially in the East. Their earliness, high yield, and attractive appearance, both in the field and when threshed, have made them exceedingly popular. They have for some time commanded high prices for seed and splitting purposes. Their distribution is being extended as rapidly as possible.

Other varieties such as Huron wheat and Manchurian barley, that have been introduced by the Dominion Cerealist, continue to give most excellent results.

NEW STRAINS.

The selection and testing of new strains at the Central and branch Farms is being continued. Some time must elapse before the studies of the large amount of material now on hand from hybridization and selection can be completed. Hulless and beardless barleys are receiving close attention, with the promise of some exceptional results. Earlier and more productive varieties are being sought for, while new strains of oats, peas, beans, buckwheat, and flax are being tested as far as available land will permit.

MILLING AND BAKING WORK.

The milling and baking researches have had to be discontinued for a time owing to the loss of the flour mill and the enlistment of the milling and baking assistant, Mr. R. W. Nichols, for overseas service. The interruption of this work is very regrettable, but it will be resumed as soon as circumstances permit.

DISTRIBUTION OF GRAIN AND POTATOES.

The annual distribution has had to be somewhat restricted this last season owing to the loss of our grain-cleaning machinery and to other temporary difficulties due to inadequate space for the work of preparing and putting up the samples. As it was impossible to accede to all requests for samples of seed, the time-limit for receiving applications was made shorter. In future, farmers who desire to secure a free sample of seed should bear in mind that applications should reach Ottawa before the end of December, and that information as to their previous crops, the character of the soil, and the varieties they have tested (if named sorts have been grown) must be given.

The quality and appearance of the grain distributed was excellent. The increasing demand for samples of peas is noted with great satisfaction, as it is felt that this crop could with profit be grown more extensively, especially in the western provinces. The potatoes distributed in Ontario and Quebec were secured from the Experimental Station at Ste. Anne de la Pocatière.

NEW CEREAL BUILDING.

Besides the main threshing floor and the granary, there are suitable rooms for the cleaning, selecting, and bagging of grain, for keeping the records of the free distribution, and also for the milling and baking work, part of which has been heretofore carried on elsewhere. Four rooms have also been provided for the Division of Forage Plants.

CEREAL WORK AT NEW STATIONS.

The inauguration of cereal tests at the new Stations has proceeded as rapidly as the land could be chosen and properly prepared.

At Ste. Anne de la Pocatière, it has been impossible as yet to do more than grow a few of the most prominent varieties on comparatively large areas. As soon as the land set aside for cereal work can be drained, a series of plot tests will be started.

At Lennoxville a start is being made in plot work this year, but the regular tests will not be commenced till the following season, as the land is not yet in suitable condition.

Preparations have been made for the starting of cereal tests this coming season at Summerland, B.C. A few varieties that are considered best adapted to the climatic conditions of this Station will be tried.

Regular tests of cereals were begun both at Invermere, B.C., and at Fredericton, N.B., last season.

DIVISION OF BOTANY.

The work of this Division is steadily increasing. Farmers are availing themselves more of the services of the officers, and increased experimental activity, through a number of new field laboratories, in various provinces, begins also to show satisfactory results.

During the year, plants to the number of 1,439 were identified, as against 955 sent in last year. A number of poisonous plants were again received from farmers who had lost live stock through this cause. Careful observations were made in each case, and these records will, sooner or later, form the subject of a special publication, which is urgently needed, on the poisonous plants of Canada.

The influence of the war on certain textile and other goods has made itself felt. The Division, therefore, devoted considerable time and thought to such questions of an economic botanical nature, as might solve the problems of these shortages, or result in the establishment of new industries.

The most important phase in these respects was the work of growing and retting flax for fibre purposes. This work has been done most conscientiously by Mr. John Adams, M.A., through whose efforts valuable information has been secured.

Experiments with hemp-growing for fibre were also commenced. There can be no doubt that there will be a ready market for any amount of hemp fibre such as was produced experimentally during the year.

The scarcity of drugs produced from the vegetable kingdom induced preliminary work concerning the growing of some of the more important medicinal plants in certain localities of Canada.

Inquiries which were repeatedly made led to the trial of chicory growing for the roasting of its roots, and also of mustard for the manufacture of table mustard.

Two new field laboratories of plant pathology have been established during the year. One is situated at Charlottetown, P.E.I., and the other at Fredericton, N.B. The work of both laboratories was commenced in July, and special attention was at first directed towards the elimination of potato diseases, and, incidentally, the improvement of the seed potato trade of these provinces. The season was exceptionally unfavourable to the farmer, but most favourable to plant diseases. It was a season in which Late Blight was more abundant than it has been, according to our observations, since the establishment of this Division nearly seven years ago. Probably 50 per cent of the possible potato crop of Eastern Canada was destroyed owing to disease.

However, this bad growing season afforded an unusual opportunity for proving the benefits resulting from careful spraying against Late Blight. In New Brunswick an average increase of 42 bushels per acre of potatoes was realized from sprayed potatoes, while in Prince Edward Island the large average increase of 100 bushels per acre was obtained.

It is thus shown that potato spraying is necessary and profitable in no mean degree. From time to time new spraying compounds are largely advertised. Among them one by the name of Kil-tone was tried, and although it did control Late Blight to some extent, the results are still in favour of Bordeaux mixture. Unfortunately, the price of copper sulphate (blue stone) has advanced some 300 per cent owing to the war. For this reason spraying was more costly than before the war, when 1 pound only cost the small sum of 6 cents.

Experiments have been commenced relative to the control of Club Root, for which purpose lime has proved very effective. On various infected farms, these beneficial results are now being demonstrated to the farmers.

An extensive series of experiments on the control of Powdery Scab has been carried out; and the results would indicate that this disease responds to tuber treatment.

In Ontario, the potato crop suffered considerably. The wet weather flooded many a field, and the potatoes rotted in the ground. In some of the scab experiments this rotting due to wet ground spoiled the records for the year.

The St. Catharines laboratory continues to do valuable work. Among the important results may be mentioned the success which Mr. McCubbin attained in concluding his researches into the cause and control of Peach Limb Canker, a disease which caused considerable losses among peach trees.

The studies of Tomato Mosaic, similar to Potato and Tobacco Mosaic disease, are being continued.

Towards harvest time farmers of the West became greatly concerned about the discoloration of their grain. Where exposed to wet weather in the stooks, numerous fungi developed, causing browning of the grain, which in some cases resulted in lower grading.

The Destructive Insect and Pest Act work relating to potatoes was continued from April to about October.

The disease White Pine Blister Rust is still engaging attention. It is a destructive disease noted under the Act, and efforts are being made, as far as possible, to prevent its spread. The white pine is perhaps the most important forest tree for general purposes in Canada, and it is hoped that the disease will not make similar disastrous inroads upon this Dominion asset, to those experienced in European countries.

DIVISION OF BEES.

During the past year the work of the Bee Division has continued to increase rapidly. An apicultural building 27½ feet by 32 feet, with 2,100 square feet of floor space, has been erected at the Central Experimental Farm, and was occupied on February 11, 1916. The building contains a laboratory, offices, and three bee cellars. The

apiary will now be located within the same grounds as the building, and by this means all phases of the Division's work will be greatly facilitated.

NATURE OF THE WORK.

The study of the principal honey-producing plants of Canada has been continued with the view of determining the conditions affecting the abundance of their yield, the duration of the yield, and the quality of the honey. Temporary out-apiaries have been established in connection with the Central Farm and two of the branch Farms, and co-operative experiments have also been started with several successful bee-keepers, in districts where honey plants which have been found desirable to study are abundant.

Collections of specimens of honey plants and samples of honey produced by them are being made.

Bee-breeding experiments have been continued, and useful data have been secured.

A phase of cellar wintering of bees, namely, the subject of humidity in the bee cellar, has been investigated in detail. It was found that in cellars where the relative humidity is low a heavy mortality of bees may occur under certain conditions. Experiments have been made to ascertain the effect of supplying moisture when deficient, and also how such a deficiency may be best prevented or remedied.

A bulletin of the Second Series entitled "Bees and How to Keep Them," by F. W. L. Sladen, is in the press. It will replace Bulletin No. 69, which is now out of print, and will give in concise form general information upon the subject of bee-keeping. The demand for a publication of this nature is steadily increasing.

APIARY WORK AT THE BRANCH FARMS AND STATIONS.

The work has been further organized during the year, and thirteen of the branch Farms and Stations now keep bees. The apiarist inspected each apiary during the warm weather in 1915, and gave advice to the Superintendents and to the men in charge of the bees. Returns have been prepared showing the comparative profitableness of the bees at each Farm or Station, and steps have been taken to systematize means for the prevention (by manipulation) of swarming, which is one of the principal causes preventing larger returns in the majority of the apiaries in Canada.

DIVISION OF FORAGE PLANTS.

The principal investigations carried on by the Division of Forage Plants during the fiscal year of 1915-16, may be classified as follows:—

1. Variety tests.
2. Breeding work.
3. Seed raising experiments.

VARIETY TESTS.

The object of the variety tests which are carried out yearly at the Central Experimental Farm, as well as at most of the branch Farms and Stations, is primarily to assist Canadian farmers by investigating the comparative value of those varieties of forage plants which are accessible through the ordinary channels of commerce. In addition, new varieties, *i.e.*, such as are not yet known in Canada or in certain districts of the Dominion, are being compared with the old standard ones. Thirty-three varieties of turnips, thirty-six of mangels, ten of carrots, three of sugar beets, and eighteen of Indian corn were tested at the Central Experimental Farm during the year.

With regard to the general results of the experiments it may be stated that the data bearing on the comparative value of the different varieties have shown a quite satisfactory degree of uniformity during the last three years. This is, to a great

extent, due to the fact that each variety has, during the period mentioned, been tested in duplicate plots, the average yield of which has been taken as an indication of the yielding capacity of the variety. Furthermore, when calculating the comparative value of the varieties grown at the Central Farm, not only the yield per acre but also the dry-matter content, characteristic of each variety, has been taken into consideration. By following this system in the variety tests, the Division of Forage Plants has been able, during recent years, to arrive at rather definite conclusions with regard to the comparative value of the different varieties tested.

BREEDING WORK.

Leguminous Forage Plants.—The breeding work with alfalfa and clover, which was started in 1912, is progressing very satisfactorily along the lines briefly indicated in last year's report. Generally speaking, the course followed in the breeding work is: (1) to establish a hardy stock, and (2) when hardiness has been achieved, to breed for uniformity and increased yield.

The first phase of this work has been successfully completed with alfalfa and red clover, there being practically no signs of winter-killing in the plots produced from plants bred for hardiness.

Breeding for uniformity and increased yield from a hardy stock is well under way with alfalfa. Several families of alfalfa plants were planted this year, and judging from their general appearance at the end of the season, the expectations of the Division with regards to the development of distinct varieties in the real sense of the word seem to be well founded.

Similar work is also under way with Red clover, but owing to the fact that cross-fertilization is necessary for production of seed in red clover, results cannot be expected as soon as with alfalfa.

During the year, steps were taken to carry out breeding work, similar to that referred to, with sainfoin which, judging from results so far, promises to be of special importance for certain districts of British Columbia.

Grasses.—Special attention has, during the last year, been paid to the breeding of superior varieties of timothy. The work, which was started in 1911, is progressing as rapidly as can be expected, but, owing to the hybrid nature of the plants from which the breeding necessarily had to be started, the advance toward the final goal, *i.e.*, uniformity and general superiority, is progressing more slowly.

The breeding work with western rye grass, started in 1912, also promises to lead to quite satisfactory results.

During the year breeding work with Red Top was started, a total of 120 plants being set out for the purpose of furnishing starting material for breeding.

Mangels.—With a view of producing improved varieties of mangels, some selections were made in 1914. About 125 roots of Yellow Intermediate mangel were selected that year. They were planted for seed production in 1915, when further selections, aiming at increased seed-producing capacity of the variety as a whole, were made.

SEED RAISING EXPERIMENTS.

Value of home-grown seed.—That home-grown seed of a variety of any kind of forage plant is at least equivalent to, and in most cases far more valuable than, imported seed of the same variety, is a truth that, fortunately, is beginning to be recognized in Canada.

With regard to clover and alfalfa, the Division of Forage Plants has shown, during the last few years, that where some difficulty is being experienced in raising satisfactory crops on account of severe winters, the difficulty can be overcome by using seed of a northern origin. Numerous results of experiments with alfalfa and clover clearly indicate that, on the whole, production of seed for home use should be encouraged as much as possible.

As to Indian corn, there are also strong indications that when seasons permit of the ripening of cobs, every ripe seed should be gathered and used for seeding. In 1914, four varieties of Indian corn produced good, ripe seed at the Experimental Farm, Brandon, Man. This year the value of the home-grown seed was tested in comparison with ordinary commercial seed of the same varieties. The result was, according to the report of the Superintendent, that "every variety produced a higher yield from the home-grown seed, with an average increase of almost two tons per acre."

These few instances are quoted to show that the Canadian farmer, by raising whatever forage plant seed he may need on his own land, can materially increase the revenue from his farm.

Seed-growing possibilities.—Having long recognized the great importance for Canada, as a whole, of establishing a seed-growing industry on a scale large enough to supply at least what is needed by the Dominion, the Division has taken steps to ascertain whether seed of the various forage plant varieties, which now are imported, can be raised successfully in the country.

On account of the situation in Europe, the necessity of paying special and immediate attention to the possibility of raising seed of field roots profitably in the Dominion, was realized by the Division as early as 1914. Accordingly, efforts were made to secure data on the subject as soon as possible. In 1914, as large quantities as possible of mangels and turnips were selected for seed-raising at the Experimental Farms, Ottawa, Ont., and Agassiz, B.C., and at the Experimental Stations at Charlottetown, P.E.I., Kentville, N.S., Fredericton, N.B., and Lennoxville, Que. This year, the selected roots were planted for seed production.

The results arrived at at the Farms and Stations mentioned, all indicate that the growing of mangel and turnip seed is not only possible, but can also be made a very profitable business. Suffice it to mention that first-class mangel seed was raised at the Central Experimental Farm, Ottawa, at a rate of 1,150 pounds per acre; at the Experimental Farm, Agassiz, B.C., at a rate of 2,100 pounds per acre; at the Experimental Stations, Lennoxville, Que., and Kentville, N.S., at a rate of 1,150 and 1,200 pounds, respectively, and that turnip seed was produced at the Experimental Station, Lennoxville, at a rate of 1,230 pounds per acre.

DIVISION OF ILLUSTRATION STATIONS.

The Illustration Stations, situated in many parts of the provinces of Alberta and Saskatchewan, afford a good opportunity for putting into practice on private farms the best method of soil cultivation, the best rotation of crops and the growing of cereals and forage crops most suitable to the different soils and localities at a minimum cost.

CROP ROTATIONS.

The rotations in operation are as follows:—

One-year rotation.—Wheat continuously.

Two-year rotation.—Wheat, summer-fallow, alternately.

Two-year rotation.—Wheat, corn.

Three-year rotation.—Summerfallow, wheat, oats

FODDER CROPS.

Alfalfa, western rye grass, and corn are grown on each of the Illustration Stations with promising results.

SEED GRAIN.

One of the special features of this Division is the production of a large quantity of good seed grain, and the placing of it at the disposal of the farmers at reasonable prices.

WEATHER AND CROP CONDITIONS.

In the provinces of Alberta and Saskatchewan heavy rains prevailed during the months of August, September, and October, year 1914, and the abundant snowfall during the winter along with the heavy rains in May, June and July, 1915, made conditions most favourable for successful crops of both cereals and fodder. On many Illustration Stations in both provinces, record yields were obtained.

WEATHER Observations taken at the following Illustration Stations:—

Month.	Temperature.		Precipitation.			
	Highest.	Lowest.	Rainfall.		Snowfall.	
Assiniboia, Sask.	°	°	Inches.	Hours.	Inches.	Hours.
June	71	44	1·54	10¾	.....	.....
July	73	48	3·81	17¾	.....	.....
August	83	56	0·21	3	.....	.....
September	59	38	1·65	16	2·0	25
October	58	36	0·35	7¼	.....	.....
November	39	18	0·18	4½	.....	.....
December	32	13	0·16	2	9·0	3
January	13	23	.....	.....	6·0	28½
February	22	17	.....	.....	4·0	8
March	26	17	.....	.....	16·0	27
Cabri, Sask.						
May	69	42	3·75	68	.....	.....
June	67	45	4·66	61¼	.....	.....
July	73	49	2·57	26	.....	.....
August	76	56	0·28	2	.....	.....
September	60	38	2·15	28	.....	.....
October	60	33	0·68	20	.....	.....
November	39	17	.....	.....	.....	.....
December	34	12	.....	.....	2·5	10
January	14	23	.....	.....	9·75	39
February	20	18	0·15	3	3·5	22
March	31	19	0·47	10½	.....	.....
Gull Lake, Sask.						
May	70	54	.....	58½	.....	.....
June	66	43	3·34	35½	.....	.....
July	71	47	2·33	42	.....	.....
August	84	52	0·38	7	.....	.....
September	65	36	1·5	13	.....	.....
Kindersley, Sask.						
May	65	39	3·12	65½	.....	.....
June	64	43	3·62	40	.....	.....
July	72	47	1·33	.....	.....	.....
August	81	48	0·84	4	.....	.....
September	59	35	1·66	14½	0·25	.....
October	54	24	0·27	5½	.....	.....
November	34	9	.....	.....	.....	.....
December	28	8	.....	.....	2·0	6
January	14	26	.....	.....	4·5	73
February	21	17	.....	.....	1·5	15
March	24	16	.....	.....	3·0	31

WEATHER OBSERVATIONS—*Continued.*

Month.	Temperature.		Precipitation.			
	Highest.	Lowest.	Rainfall.		Snowfall.	
	°	°	Inches.	Hours.	Inches.	Hours.
Shaunavon, Sask.						
May			4·86	78		
June	63	44	4·96	40		
July	70	48	4·63	9		
August	83	51	0·22	½		
September	58	37	1·42			
October	58	32	0·94			
November	37	17				
December	29	14				
January	14	21				
February	23	19				
Manyberries, Alta.						
May			2·0	16		
June	84	58	0·75	1		
July	68	43	6·2	41		
August	81	58	0·52	1		
September	64	50	0·02	5		
October	58	46				
November	34	28				
December	31	18				
January	18	28				
Milk River, Alta.						
May	67	57				
June	70	57	2·95	41		
July	75	57	3·62	30½		
August	80	55	0·3	2		
September	59	38	1·44	9		
October	58	37	1·23	39		
November	37	19			6·0	16
December	32	15			4·0	
January	15	20			12·0	
February	27	20			7·0	11
Whitla, Alta.						
May	74	48				
June	68	46	3·0	9		
July	76	56	4·37	32½		
August	83	55				
September	59	39	2·45	9		
October	62	33	1·44	30		
November	41	17			2·0	

MEETINGS AND ADDRESSES GIVEN.

During the year seventeen meetings were attended, six in Ontario, two in Quebec, five in Alberta, and four in Saskatchewan.

The meetings in Alberta and Saskatchewan were held in connection with the Illustration Station work, the work being fully described by the Supervisor, also by Mr. M. J. Tinline, Mr. W. H. Fairfield, and the Assistant to the Supervisor, Mr. J. F. Irwin. Many inquiries were made by those in attendance, and much interest taken in the work, particularly in the different rotations and methods of soil cultivation.

DEMONSTRATION FARMS.

The work inaugurated by the Commission of Conservation in 1913 was taken over by the Department of Agriculture in April, 1915, to complete the term agreed upon between the individual farmers and the commission.

Eight farms were operated in Ontario, seven in Quebec, four in Nova Scotia, four in New Brunswick, three in Prince Edward Island, one in Saskatchewan, one in Alberta, and one in British Columbia.

The following demonstrations were conducted:—

(*a*) Soil cultivation.

(*b*) After-harvest cultivation vs. fall ploughing.

(*c*) Summer pastures and soiling crops.

(*d*) Corn growing, demonstrating the most suitable variety to the locality.

(*e*) Demonstrating pure seed vs. ordinary seed grain.

(*f*) Thick vs. thin seeding of grain, Thick vs. thin seeding of clovers and grasses.

(*g*) Growing clover and timothy seed, home-grown clover vs. imported seed.

VISITS.

The Supervisor of the Illustration Stations visited all the farms in Ontario, Alberta, Saskatchewan, and four in Quebec. Mr. J. A. McClary visited three farms in Quebec; Mr. F. J. Nunnick, Agriculturist of the Commission of Conservation, visited all the farms in Ontario, Quebec, Nova Scotia, New Brunswick, and Prince Edward Island.

The work on the different Demonstration Farms proved to be of very great benefit and created considerable rivalry amongst the farmers throughout the neighbourhoods in which they were located.

POULTRY DIVISION.

SCOPE OF THE WORK.

The work of the Poultry Division is primarily experimental, though it must necessarily include more or less of the demonstrational work as well.

Experimental.

Experimentally, the Division has to do with breeding, mating, incubating, brooding, rearing, housing, feeding, production of eggs, the preparation of all poultry produce, the study of poultry diseases, etc.; in fact, the experimental side of the work covers everything that will make it possible for the producer to produce more and better stuff, worth more when it is ready to be marketed and at as low a cost as possible.

When one takes into consideration that any one of these subjects may require numerous experiments, it suggests the field that offers itself to the Poultry Division for experimentation.

Demonstrational.

The demonstrational work is presented through the plant at the Central Experimental Farm and through the poultry departments of the various branch Farms and Experimental Stations throughout the Dominion. Through circulars, bulletins, seasonable hints, and various other forms, the information is widely distributed.

At present, the Division has ten exhibition circulars dealing with incubation, brooding, rearing, housing, trap nests, crate feeding, turkeys, and waterfowl. Several bulletins dealing with poultry keeping, houses and marketing have been prepared and will be published shortly. Blue prints of houses and equipment are also available to those who ask for them.

Equipment.

At present, there is, outside of the Central plant at Ottawa, poultry plants at twelve of the branch Farms and Stations, and the other Farms and Stations will, just as soon as possible, take up poultry work.

The Central Plant.—The old poultry buildings that had been in existence for the last twenty-five years were taken down last summer, and in place of them, it is hoped to have an administration building which will include offices, incubator rooms, etc. In the meantime, the offices are located in the feed room which was constructed two years ago.

During the past year three permanent houses were erected on the poultry plant and one duck house on the water-fowl plant. Plans of two of these poultry houses and the water-fowl house are given in the report of this Division.

In the construction of the buildings and the arrangement of the plant, a general plan is being adhered to, which, though it may take years to complete, will be much more convenient both for those on the plant and for the public wishing to see it. The plant is being so arranged that visitors can inspect it at any time, either Sundays or holidays, and can see practically anything thereon without it being possible for those who are so disposed to interfere with any of the experimental work.

The Branch Farms.—The poultry plant on a branch Farm comprises what we call an administration building, in the basement of which is situated the incubators and testing rooms. Upon the ground floor is an office, a bed-room and a feed-room, and the attic is used for storage purposes. In addition to this there are one or two farmer's poultry houses, which accommodate one hundred hens each, a number of colony houses for breeding and rearing, and sufficient brooding capacity to rear six to eight hundred chicks a year.

These plants are for the purpose of demonstrating that farm poultry, rather than poultry farms, are profitable, and though most of the experiments are carried on at the Central Farm, because of the extra help and equipment required, experiments of a local and provincial character are conducted at these branches, and it is through these Farms that the breeding stock is distributed to farmers in the various provinces.

STOCK.

All told, there were, on the first of January, 1916, 4,299 birds on the Experimental Farms system, of which about 4,000 were hens, the others being made up of water-fowl, turkeys, and pigeons. Of the hens, three-quarters belong to the general-purpose breeds, and one-quarter are Mediterraneans, practically all White Leghorns. The Leghorns, outside of the Central Experimental Farm, are found principally in Southern Alberta and British Columbia, where climatic and other conditions seem to favour this class.

TURKEYS.

Two years ago, the Poultry Division took over the practical work in connection with turkeys, purchased a number of breeding birds and carried on the work last year, both at the Central plant here at Ottawa and at two of the western Farms, one in Alberta and one in British Columbia. At these western Farms, good results were obtained, where considerable range was available. At Ottawa, in confined yards, satisfactory results were also obtained. Further work along this line is being conducted.

EXTENSION WORK.

The requests for judging and lectures continue, Mr. Fortier having been absent from the office 129 days during the year on this work. During this time he visited and judged at fifteen exhibitions, gave sixty-two lectures, and inspected a number of poultry plants at the request of the proprietors and managers.

A new form of extension work was taken up this year in a small way. It is reported in this annual report as "survey work." From results secured so far, it would appear to be valuable, in that data as to actual farm conditions were secured, and better returns to the farmers made possible.

TOBACCO DIVISION.

In the course of the year 1915-16, the organization of the Tobacco Division underwent important modifications.

The resignation of Mr. W. A. Barnet, formerly manager of the station at Harrow, and the temporary appointment of Mr. G. C. Routt, formerly tobacco inspector for Ontario, interrupted the work of inspection during the season of 1915.

However, towards the end of the autumn, two new officers were appointed. One of these, Mr. H. A. Freeman, will devote himself to the study of the tobacco soils of Canada, and to the inspection of those centres of the tobacco-growing industry in Ontario farthest away from Harrow. The other, Mr. D. D. Digges, will direct that station, replacing Mr. Routt, who has been recalled to Ottawa to conduct a plant pathological laboratory, which will be devoted to the study of problems in connection with tobacco growing.

The season of 1915 was one of the most unfavourable that tobacco growers of Canada have experienced for a great number of years. The summer was exceptionally cool, the rainfall too frequent and abundant, with the result that the tobacco matured with difficulty. These adverse conditions were felt especially in Quebec, where the texture of the tobacco leaves was sensibly weakened.

The burleys in Ontario, because of the failure to mature properly, and also because of difficulties experienced in their dessication, were a little more dark coloured than usual. The yellow tobaccos, however, were quite a success and furnished a crop at least equal in quality and superior in weight to those of previous years.

CENTRAL EXPERIMENTAL FARM.

Planting.—Among the varieties cultivated at Ottawa, those which received the most attention were Obourg, Maryland, and Aurora. The Marylands suffered, to a great extent, from unfavourable weather conditions, but Aurora and Obourg furnished tobaccos which were interesting from an industrial point of view.

The cultivation of these two varieties should be developed in 1916, in order to submit them to the process of fermentation, which will decide their final value.

The crop of seeds was less abundant than usual, the coolness of the season not being favourable to fecundity.

Fermentation.—Towards the end of the autumn of 1915 we resumed the fermentation of a part of the 1914 tobacco crop, which, packed in boxes, had not fermented enough during the summer. The method practised in Ohio for the treatment of tobacco fillers was employed successfully. A quantity of Brazil, which had before proved refractory to the process of fermentation in heaps or in boxes, was made utilizable by this method. Certain tobaccos used for wrappers and treated by this method behaved in such a manner as to induce the belief that they could be used when clear colours are not specially sought.

Tobacco of the 1915 crop was treated by the method employed in Connecticut for tobacco wrappers cultivated in the open air (forced fermentation in boxes).

TOBACCO STATION, ST. JACQUES L'ACHIGAN, QUE.

The tobacco crop at the St. Jacques l'Achigan station suffered considerably from the unfavourable weather conditions. Of all the tobaccos tried in 1915, only Aurora

gave a crop of satisfactory quality; its weight, however, was much below that of the same variety obtained at Ottawa and Farnham. The drying process was effected satisfactorily. As soon as this operation was finished, the tobacco was packed and sent to Ottawa to be sorted and fermented.

TOBACCO STATION, FARNHAM, QUE.

Only Big Ohio x Sumatra gave really satisfactory results. All the other varieties either matured insufficiently, or suffered considerably from the adverse weather conditions, producing dry-textured leaves, without elasticity or, in a word, wrappers of an inferior quality. The drying of these tobaccos was relatively difficult, a little fermentation taking place. The variety that suffered most was Virginia. It had been intended to use this variety for the production of yellow tobacco by drying in cold air. It seems impossible to obtain these yellow tobaccos, in an unfavourable season, in a part of Canada where maturity usually takes place about the middle of September. At this date, which in Ontario corresponds very closely with that of the harvest of tobaccos used for this purpose, the night temperature in the province of Quebec is very low, and it is difficult to obtain and maintain in the drying room the required temperatures. At the other places, these tobaccos are exposed to the dangers of frost during the last fifteen days before harvesting.

TOBACCO STATION, HARROW, ONT.

In a general way, the results of the experiments undertaken at Harrow have been perverted by an abnormal crop of White Burley. However, the crop of yellow tobaccos was perhaps the best ever obtained at this station. If the unfavourable weather conditions are taken into account, the quality of this part of the crop must be attributed to the attention given to it, and to the ability of the staff in charge of the operations.

Unfortunately, as elsewhere on a great number of tobacco plantations in Ontario, tobacco root rot (*Thielavia basicola*), favoured by the cold and wet growing season, wrought much damage to the crop.

In a general manner, the progress made in 1915 by the Tobacco Division has above all consisted in the manipulation of tobacco fillers. It is almost certain that the types of fillers grown in the United States, especially in Ohio, would give good results in Canada, provided they were treated in a proper manner, especially in order to reduce their strength of nicotine. Moreover it seems that it should be more easy to obtain this thin-leaved filler tobacco in Canada than in Ohio, judging by the comparative thickness of Canadian and American Aurora.

In connection with wrapper tobacco, at least one of the varieties specially experimented with during the past year is in course of being tried on a large scale, with every chance of success. This is Big Ohio x Sumatra, which was found in 1915 successfully to resist the excessive humidity, producing wrappers of a convenient size and good elasticity.

It might perhaps be well to mention here Yamaska, another new variety which has been experimented with for some time by the Tobacco Division. Notwithstanding having suffered from the abnormal weather conditions, this variety produced in 1915 a filler particularly interesting because of its aroma. This tobacco, which heretofore has been studied for the purpose of obtaining leaves for wrappers, seems, when the season does not favour the production of wrappers of superior quality, to be capable of being utilized as filler tobacco. In a country where unfavourable atmospheric conditions must always be guarded against, in so far as the cultivation of tobacco is concerned at any rate, the production of a tobacco capable of being used for two purposes is a prudent measure which cannot be too much recommended.

DIVISION OF EXTENSION AND PUBLICITY.

In our report for last year, a brief sketch was given of the plan by which it was proposed to spread as widely as possible among our farmers the results of the work of the Dominion Experimental Farms. Some account was also given of the success attained by our first organized efforts in that direction.

During the fiscal year just closed, the organization of this extension work has been continued, and much progress made in the endeavour to get more closely into touch with the Canadian farmer. Early in the spring of 1915, the Division of Extension and Publicity was formed, with Mr. J. F. Watson as chief officer. To his energy, experience, and marked executive ability, seconded by the interest shown by the Central Farm officers and the superintendents of the branches, must the credit be given for the excellent results obtained from the publicity campaign of the past year.

The efforts made to reach as many farmers as possible were directed through four main channels:—

1. Through the placing of an instructive and well-arranged Experimental Farms' exhibit at as many as possible of the fairs held throughout the Dominion. Arrangements were made last year to attend 160 of these. A large number of the smaller fairs were included, in order to reach the thousands of farmers who have little or no opportunity of visiting the larger exhibitions. Some of these fairs and exhibitions were cancelled by their managements, but an Experimental Farms' exhibit was shown at 145 places throughout Canada during the season, which opens about the middle of June and lasts until the end of October.

2. Through the issuing of a large number of Exhibition Circulars. These have proved an excellent medium for spreading information by distributing them at fairs, mailing to applicants, and in replying to correspondents. Nearly a hundred of these circulars have so far been issued, covering most of the main lines of agricutural effort.

3. Through the enlarging of the mailing lists. These lists have now been classified according to the subject or subjects in which each person on the lists has indicated his interest, and to each of these is sent every publication of the Department dealing with those matters on which he desires information. At each exhibition or fair attended, visitors have been given an opportunity of having their names placed on our lists. Return cards have been sent out to each farmer on every rural mail delivery route, and it is planned so to circularize every farmer in the Dominion as rapidly as the departmental equipment will permit. The response so far to our efforts has been most gratifying. Our mailing lists have, as the result of two seasons' special effort, been increased from 70,000 to some 225,000 names.

4. Perhaps nothing has done more to popularize the work of the Experimental Farms than the bringing out of "Seasonable Hints." This is a pamphlet of sixteen pages, three issues of which were distributed during the past fiscal year. It is made up of contributions from our various officers, and is prepared for press by Mr. Watson. Each issue deals with timely farm topics, the great aim being to get it into the farmer's hands in time to aid him in his current work. Larger editions of this pamphlet have been required for each issue, and large numbers of appreciative letters have been received. Arrangements were made with the Canadian banks whereby some 3,000 of their rural branches in all parts of the Dominion were furnished with a supply of each issue of the Hints. Those have been kept on a special desk in each case, so placed as to attract the attention of the bank's customers. The managers of these banks have, in addition, sent us in the names of some 200,000 farmers in their districts. Every effort is being made to get each one of these interested in the work of the Farms, and a reader of our publications. The increase of 44,000 in the number of letters received in 1915 gives some indication of the success attending the extension and publicity work.

The Division has also been of great assistance in the work of the Farms in other directions. One great difficulty has always been the impossibility of getting into touch promptly with the press or the farming community, when some unforeseen agricultural problem arose demanding prompt solution. By means of the multigraph operated by this Division, a number of leaflets and press notices have been run off during the year, by means of which we have been able to give timely and, it is hoped, valuable advice in several such emergencies. In addition, large quantities of report forms, etc., have been multigraphed for the Divisions at the Central Farm and the branch Farms and Stations, thus materially reducing our printing bills.

For the coming year, the work is being continued and extended along the lines indicated above, with every prospect for continued good results.

EXPERIMENTAL STATION, CHARLOTTETOWN, P.E.I.

THE SEASON.

The winter of 1914-15 was marked by both extremely cold and unseasonably mild weather, but ample snowfall in March served to protect vegetation during the early spring. May was backward, and seeding commenced about the 15th. June, July, and August gave excellent growing weather, with ample rainfall. The hay crop was heavy and was saved in good condition. Grain crops were excellent. Potatoes and roots were harvested without frost injury. Fall pasture was good, and live stock entered the winter in good condition. Fall ploughing was fairly well completed. December, January, and the first half of February were mild and open. The latter half of February was cold and clear, but March was stormy, with a record snowfall of 66 inches for the month.

METEOROLOGICAL RECORDS.

Months.	Temperature Fahr.					Precipitation.					
	Maximum.		Minimum.		Mean. Deg.	Rainfall.		Snowfall.		Total	Bright Sunshine
	Date.	Deg.	Date.	Deg.		Days.	Ins.	Days.	Ins.	Ins.	
1915.											
April	20	57	9	20	37·55	9	1·80	1	7·00	2·5	140·9
May	24	68	7, 15 & 18	31	44·74	20	3·97	.....	.....	3·97	160·1
June	7	77	3	35	54·76	12	3·13	.....	.....	3·13	195·5
July	11	81	3	42	63·64	8	1·95	.....	.....	1·95	238·9
August	12	81	28	42	63·64	17	2·22	.....	.....	2·22	203·3
September	7, 8	80	26	35	57·23	12	3·98	.....	.....	3·98	169·9
October	14	67	16, 18	31	47·66	12	3·83	.....	.....	3·83	145·1
November	2	54	24	21	38·48	17	4·51	.....	.....	4·51	58·6
December	26	50	31	11	29·71	9	6·04	12	13·1	7·35	48·1
1916.											
January	23	43	18	−10	18·88	4	1·05	17	25·6	3·61	91·6
February	1	45	15	−16	17·10	5	0·88	9	19·2	2·8	117·4
March	31	47	13	−10	19·54	.....	.....	15	66·0	6·6	129·8
Total annual	.....	.....	.....	.....	.....	125	33·36	54	130·9	46·45	1,699·2

BUILDINGS.

A poultry administration building 20 by 30 feet, with incubator room and a cellar for the winter storage of bees, was erected in the northeast corner of the poultry yards. A permanent poultry house 16 by 32 feet was built quite near, and the yards extended to inclose the greater part of rotation "F."

A plant pathological laboratory was erected on the Mutch lot, fronting on the Mount Edward road.

UNDERDRAINAGE.

The underdrainage systems already laid gave satisfaction. Much of the land which gave heavy crops could not have been worked during the season of 1915 but for the action of the underdrains in carrying off the excessive rainfall during the late spring and summer.

HORSES.

A grade Clydesdale mare was purchased in the spring of 1915. She proved to be with foal and raised a good horse colt late in the season. Darling of Taunton dropped an excellent horse colt on June 6. He is at present a very promising youngster. The seven horses and two colts now at the Station are in good healthy condition and ready for the spring work.

DAIRY COWS.

Two Ayrshire cows, Lady Petunia of Spruce Row and Helen of Spruce Row are kept to supply the Station with milk. Lady Petunia raised a bull calf. The records of these cattle will be found in the Animal Husbandry section of the report.

STEERS.

Steer-feeding experiments were continued with beef vs. dairy types of steers. Five pens of four steers each were started, after being dehorned and let run for three weeks on rape. Details will be found in the Animal Husbandry section of the report.

SHEEP.

As sufficient pasturage was not available for the eradication of the internal parasites that infested the Leicester flock of sheep, they were sold to the butcher.

Lamb fattening experiments were conducted with three pens of ten lambs each. Clover hay vs. oat hay were compared as roughage. A further experiment was conducted with heavy vs. light grain ration in fattening lambs.

POULTRY.

The flocks of Barred Plymouth Rocks and White Leghorns were increased during the year. A permanent house 16 feet by 32 feet was built, with a straw loft. This gave excellent results as it remained dry throughout the winter. With the enlarged yards and greatly improved equipment, the poultry plant is in good shape for the coming season.

BEES.

Four colonies died during the winter of 1914-15, leaving large stores of sugared honey. The five remaining colonies were weak. These were united and built up during the season. Two strong colonies were wintered outside in a wintering case and two were placed in cellar. One of the colonies outside died, apparently from the same cause as the trouble the previous winter, namely, sugared honey. The other colony wintered outside and the two that were wintered in the cellar are strong and vigorous.

FIELD CROPS.

Average yield per acre on the experimental farm rotations:—

Wheat.—The average yield from four fields of wheat was 32 bushels 43 pounds. One field, C-3, gave a yield of 41 bushels 36 pounds of Early Red Fife. For uniformity and purity this was the finest field of spring wheat yet grown at the Station.

Barley.—The average yield from two fields of barley was 48 bushels, 47 pounds. Old Island Two-row, a variety that originated in this province and which has led the list of varieties at this Station for three years, produced, on rotation A-2, 54 bushels 43 pounds.

Corn.—Only one field of corn was grown for ensilage purposes. This field of Longfellow was cut and cured as corn stover when in the late milk stage. It produced about 12½ tons of good corn stover.

Hay.—The average yield from twelve fields of hay was 2 tons 893 pounds. A heavy crop of clover on A-5 gave a yield of 3 tons 95 pounds.

Mangels.—The average yield of two fields of mangels was 23 tons 1,935 pounds.

Oats.—The average yield from four fields of oats was 67 bushels and 19 pounds. The Banner oats on A-4 produced 82 bushels of seed which the Dominion Cerealist agreed to rank as class "A," Dominion Experimental Farms Registered Banner oats. This should be ideal foundation stock for the farmers of Prince Edward Island. A 6-acre field of registered first generation Banner oats, gave an average yield of 60 bushels, 1 pound per acre.

Potatoes.—The average yield from three fields of potatoes was 310 bushels 20 pounds. These potatoes were sprayed regularly and the tops remained green until harvested, while potatoes in the neighbourhood not sprayed were killed fully a month earlier.

Turnips.—The average yield from two fields of turnips was 24 tons 723 pounds.

FARMERS' PICNICS, VISITORS.

Many farmers' picnics were held during the summer season. These were well attended and greatly appreciated. A picnic for the children of the public schools of Kings county brought 435 children, their teachers and inspectors, for one of the big days of their lives. The total number of visitors recorded during the year was 6,345.

EXHIBITIONS.

The Experimental Station exhibit was a very attractive feature at the county exhibitions at Summerside, Georgetown, Alberton, and Souris. The largest display was made at the Provincial Exhibition at Charlottetown, where many farmers had an opportunity to learn of the work being done for them in this province.

A horticultural exhibit was placed at the annual show of the Prince Edward Island Floral Association, August 24 and 25, 1915.

Besides being present with the Station exhibit the Superintendent assisted in judging at all the autumn fairs, including the Provincial Exhibition. He also attended four seed fairs during February and March, judging cereals.

CONVENTIONS, ASSOCIATIONS AND CONFERENCES.

The Superintendent attended the several provincial agricultural conventions and associations and gave addresses or assisted in the discussion. At the meeting of the Canadian Seed Growers' Association, held at the time of the Maritime Winter Fair, he gave an address on "Some Observations from Recent Experimental Work at the

Charlottetown Station." Two agricultural conferences were attended during the year; one on dairying, arranged by the representative of the Dairy Division of the Live Stock Branch, and one dealing with all provincial industries, called by the Premier of the province. At the latter conference the Superintendent gave an address on "Intensive Farming and Farm Drainage". The tone of all these meetings was most optimistic and augurs well for the future development of the province along all lines.

SHORT COURSES AND AGRICULTURAL MEETINGS.

Owing to the mobilization of the 105th Battalion in the province during the winter of 1915-16, the agricultural halls at Charlottetown and Summerside were taken over for barracks. Other suitable buildings were not available in the cities. A series of short courses was arranged by the provincial Department of Agriculture for a number of smaller centres over the province as follows: Palmer Road, O'Leary, Egmont Bay, Mont Carmel, Hillsboro, Murray River, Tracadie, and Souris. Five days were spent in each locality and, where possible, thirteen sessions were held. The Superintendent assisted the provincial department with all of these and gave a brief series of lectures on cereal husbandry and soil tillage at each. The attendance was much greater than expected. One week the average attendance was over 230 students for the thirteen sessions. The chief advantage of the above method was the opportunity of dealing with local conditions with the people right at their homes. The Superintendent also gave lectures on horticulture to six short courses in domestic science held in Prince of Wales College during January, February, and March, 1916.

A field meeting of the provincial branch of the Canadian Seed Growers' Association was held at the Station. The members had an opportunity of seeing and discussing their strains of registered seed as grown side by side in the uniform test plots at the Station. The meeting was well attended, and suggestions of the Dominion Cerealist and the Secretary of the Canadian Seed Growers' Association *re* further improvement of our grains were much appreciated.

SALES OF SEED GRAIN AND DISTRIBUTION OF SEED POTATOES.

Fourteen lots of registered Banner oats and ten lots of Marquis wheat were sold to farmers. Twelve samples of potatoes were sent out in the spring of 1915.

An acre of class "A" Banner oats was grown on the Station in 1915. This has been registered as "Elite Stock" seed and will be sold to prospective members of the Canadian Seed Growers' Association.

The demand for registered seed has greatly increased, and there is at present a considerable quantity of registered seed of the first generation of the leading cereals in the province for sale by the Experimental Station.

EXPERIMENTAL STATION, KENTVILLE, N.S.

THE SEASON.

The temperature during April was uniform, and a few slight frosts occurred in May. Low temperatures and continued wet weather delayed seeding operations, the first sowing taking place May 18. The rains continued in June except in the first week, and crops on heavy soils made poor growth. The weather in May and June was unfavourable for spraying operations, consequently a great deal of apple scab was noticed. In July the field crops made rapid growth, but wet weather delayed haying considerably. Small fruits were a good crop and extended over a long period. Much of the hay crop was damaged owing to the wet weather in August, and blight damaged

the potato crop. Fine weather in September allowed the grain to be harvested in good condition, but a slight frost on the 26th injured the corn. The grain crop was a little lighter than in 1914. October and November were good fall months and fall operations were completed in good time. The turnip and apple crops were disappointing. December was mild and open, and January fairly cold, with light flurries of snow during the middle of the month.

METEOROLOGICAL RECORDS, 1915-16.

Month.	Temperature F.			Precipitation.			Total Sunshine.
	Mean.	Highest.	Lowest.	Rainfall.	Snowfall.	Total.	
1915.	°	°	°	Inches.	Inches.	Inches.	Hours.
April	39·36	64	21	1·15	5·5	1·70	107·4
May	46·14	71	28	2·24	2·6	2·50	160·9
June	56·8	81	33	2·43	.....	2·43	180 2
July	64·0	82	46	1·52	.....	1·52	215·7
August	63·8	81	42	3·84	.....	3·84	168·3
September	57·25	83	30	0·85	.....	0·8	194·0
October	49·05	72	28	3·88	.....	3·88	171·1
November	39·15	61	22	2·81	.....	2·81	65·5
December	29·14	54	6	2·34	15·3	3·87	56·4
1916.							
January	23·25	51	— 4	0·65	11·5	1·8	93·4
February	18·77	49	—19	1·51	26·5	4·16	60·3
March	22·09	55	— 2	0·01	40·5	4·06	120·4
Total annual	.....	.....	.....	23·23	101·9	33·42	1,593·6

CROPS GROWN.

Five acres of Banner oats, seeded May 18 on an area previously in corn, yielded an average of 57·75 bushels per acre. Five acres seeded June 11 on land newly broken the previous fall yielded an average of 27·4 bushels per acre. Five acres seeded July 2 on land cleared of stumps the previous month yielded 17·8 bushels per acre. In addition, 4 acres of fertilizer and cereal plots were in grains, making a total of 19 acres in grain crops, 10 acres of which were seeded to clover and timothy. Nine acres were planted in potatoes, of which 5 acres were on the permanent fertilizer area. The yield was variable on the latter field, as would be expected, and ranged from 60 bushels on the plot not fertilized to 197 bushels on one of the fertilized plots. The potatoes generally on the front fields were a light crop, whereas 1 acre of Green Mountain on a newly-broken area which was in oats the previous season yielded 202 bushels per acre. Ten and one-half acres were in corn for ensilage, and averaged 10 tons 1,189 pounds per acre. Six acres were in root crops, giving an average yield of 611 bushels per acre. The seventeen acres of newly-broken land seeded to clover and timothy in 1914 produced a poor hay crop. The clover, except in small patches scattered over the area, made very little growth. The average yield was 1 ton 477 pounds per acre. The marsh area of 8 acres yielded 1 ton 842 pounds per acre. The total hay harvested amounted to 35 tons 1,582 pounds.

FRUITS PLANTED.

Additional plantings were made of orchard fruits during the past season. The total area in orchard fruit is 46·7 acres made up as follows:—

Orchard.		
Peach	acre.	1
Cherry	"	1
Plum	acres.	1·7
Apricot and Quince	"	·2
Commercial pears	"	2·0
Variety pears	"	1·2
Dwarf apple	"	·5
Variety apple	"	6·0
Commercial apple	"	32·7
Filbert nut	"	·4
Total	acres.	46·7

Included in the apple orchard area are 2 acres interplanted to plums and cherries.

The total numbers of orchard trees planted are as follows: apples 2,616, plums 367, cherries, 154, peaches 106, pears 223, apricots and quinces 23, a total of 3,489 trees made up of 487 varieties. A collection of thirty varieties of English gooseberries was added to the list of small fruits.

LAWN TREES, SHRUBS AND FLOWERS.

The shrubs and trees have made excellent growth during the season and these, with the annual and perennial flowering plants, add much to the attractiveness of the farm during the year.

VEGETABLES.

Tests have been conducted with different varieties of the various vegetable crops.

ROOTS, CORN, AND CEREALS.

The cereal tests were confined to three varieties of oats and two each of wheat, barley and peas. Forty varieties of roots and fourteen varieties of corn were tested in duplicate plots.

FERTILIZER EXPERIMENTS.

The area devoted to special fertilizer experiments conducted during the season was as follows:—

Permanent fertilizer area	acres.	4
Orchard fertilizer area	"	2·4
Dog fish fertilizer area	"	1·9
Lime and phosphate area	"	2·2
Seaweed fertilizer area	"	·5
Total	acres.	11·0

FENCING.

One thousand seven hundred feet of fence was erected across the upper part of the ravine on an extremely rough piece of ground.

UNDERDRAINING.

Seven acres of dyked marsh was underdrained, 10,160 feet of tile being laid. The cost was $74.69 per acre.

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View from top of Superintendent's House. Experimental Station, Kentville, N.S., Sept., 1915.

Children's Excursion to the Experimental Station, Charlottetown.

Over 1,000 people visited the Experimental Station at Lacombe on July 23rd, 1915.

CLEARING LAND.

Twenty acres of land was broken up during the season. Owing to the stumps being green the cost of clearing was very high. The average cost per acre was $255.70. This makes a total of 112 acres cleared which was all in forest growth when the Farm was purchased.

OVERFLOW WATER.

The usual trouble with overflow water was experienced again this season. A large catch basin has been built at the base of the hill to catch this water and divert it to a 12-inch tile drain. It is hoped this will prevent much of the washing experienced in the past.

APIARY.

The six colonies of bees increased to fourteen during the summer, and the fourteen colonies were carried through the winter in cases outside. The flow of honey was only fair, the season being rather too dark and wet for large yields.

POULTRY.

The poultry have for the most part, made good egg yields during the winter, the early-matured pullets having done exceptionally well. The early hatches, owing to the cold, backward and wet spring weather, show considerable loss of young chicks. The Barred Plymouth Rock, Rhode Island Red and White Wyandotte are the breeds kept. Some Pekin ducks were also raised and a small 8-foot by 8-foot duck-house was erected.

LIVE-STOCK.

The year has been a successful one with all kinds of lives-stock. One pair of horses unsuitable for our heavy work were sold and replaced with a pair of heavier horses. Two registered Shorthorn cows and two heifers were purchased. The Shorthorn stock, consisting of twenty-seven head, is made up of one herd bull, ten cows, two heifers, two years old, four yearling heifers, four heifer calves, and six bull calves. Five Shorthorn bulls for breeding purposes were sold during the year. Twenty-four steers were carried from November to March on a feeding test. Three pair of working oxen were carried during the summer for breaking land.

EXPERIMENTAL ORCHARD WORK.

The experimental orchard work as carried on during the past two years at Berwick, Kings county, N.S., Falmouth, Hants county, N.S., and Bridgetown, Annapolis county, N.S., has been continued this season. This work has been carried on by Mr. R. D. L. Bligh at the first two named places, and by Mr. M. P. Pike at Bridgetown.

AGRICULTURAL MEETINGS.

Two weeks were given up to agricultural lecture work in addition to which the Fruit Growers' Convention, and Farmers' Association meetings were attended and papers bearing upon experimental work conducted at the Station presented.

EXHIBITIONS.

An exhibit of produce grown at this Station, and models of farm buildings, poultry equipment, and apiary supplies, etc., was put up at the Nova Scotia Provincial Exhibition, Halifax, N.S., September 8 to 16. The same exhibit was shown at Bridgewater, Lunenburg county, N.S., September 29 to October 1.

The exhibit occupied a wall space of 60 feet with a table 3 feet wide in front on which the produce and various models were displayed. Leaflets, bulletins, and reports were distributed to the many visitors who took occasion to study the exhibit. Farmers

visiting the exhibit were apparently interested and desirous of securing reliable information, and without a doubt such an exhibit is a great help in bringing the farmers in close touch with the work of the Experimental Farms.

ASSISTANTS.

Mr. R. D. Lindsay Bligh, B.S.A., was appointed as assistant early in May to replace J. M. Robinson, B.S.A., who is with the overseas forces. Mr. Bligh had charge of the experimental orchard work at Berwick and Falmouth during the summer, which work he carried on in a very satisfactory manner. The time not spent at this work has been spent at the Station helping in the various departments. Mr. M. P. Pike, Bridgetown, N.S., has conducted the experimental orchard work at Bridgetown in a careful and satisfactory way. The foreman, Mr. Alfred Bishop, the herdsman, Mr. A. S. Porter, the poultryman, Mr. Warden Plant, and the greenhouseman, Mr. W. T. Blair, have all given excellent service in their respective departments during the past season, and have assisted materially in recording data as given in the annual report.

EXPERIMENTAL FARM, NAPPAN, N.S.

THE SEASON.

The winter of 1914-15 was very unsettled, and spring opened up very late. Wet, cold weather was experienced all through May, and seeding did not commence until June 1. The greater part of the cereals were sown during the first half of June, and notwithstanding the cool nights, germination was very rapid. Wet, muggy weather in the latter half of the month interfered with the progress of the barley, but the wheat and oats continued to make healthy growth. Grasses and clovers came through the winter in excellent shape, and made good growth. Roots were not seeded until July 3, owing to unfavourable weather conditions. July was fine and warm, but August was quite unseasonable, and while cereals grew well, roots made only fair progress, and haymaking was often interrupted by rainy weather. September was cool and the grain ripened too fast to fill well. October was unsettled, and in November much cold weather was experienced, which made the harvesting of roots difficult. Much snow fell, and cold weather was experienced in December, and January also was cold, but the fine weather in February and March greatly facilitated lumbering operations.

WEATHER OBSERVATIONS, 1915-16.

Month.	Temperature F.			Precipitation.			Total Sunshine.
	Highest.	Lowest.	Mean.	Rainfall.	Snowfall.	Total.	
1915.	°	°	°	Inches.	Inches.	Inches.	Hours.
April	62	18	36·50	2·19	11·00	3·29	100·90
May	71	26	45·72	4·43	.....	4·43	136·15
June	81	30	56·44	3·57	.....	3·57	195·00
July	81	43	62·99	1·95	.....	1·95	215·10
August	81	34	63·04	4·67	.....	4·67	186·60
September	78	32	56·49	1·47	.....	1·47	175·70
October	68	24	43·11	4·11	.....	4·11	145·60
November	57	19	38·46	4·63	.....	4·63	47·90
December	52	6	28·59	3·96	8·00	4·76	64·40
1916.							
January	47	−10	19·17	0·20	11·00	1·30	108·60
February	48	−24	16·54	0·36	26·00	2·96	94·50
March	54	−12	20·50	.....	38·00	3·80	105·35
Total for year	.....	.....	.....	31·54	94·00	40·94	1·575·80

BUILDINGS.

During the season much repair work was accomplished at this Farm. The old horse stable, which was inadequate for the number of horses kept, and also had poor ventilation and light, was remodelled. The interior, which was all of wood, was removed, the building raised and a good concrete foundation placed under it, and a cement floor laid inside; in fact, the whole interior was remodelled and the Rutherford system of ventilation installed, converting it into an up-to-date horse stable, which will stable eighteen horses, having plenty of light and good ventilation.

The old sheep barn, which will be used later for bulls and young stock, was resilled and also had doors and windows repaired.

The implement and carriage shed, which is now all in one building, one hundred and fifteen feet long, was re-shingled and three dormer-windows built on the front side to admit more light to the second story. Instead of stationary windows they were put in as doors with windows in the upper portion, thus facilitating the storing of material.

Owing to the bad weather at the time of painting, this work was greatly handicapped. However, the following buildings were all nicely painted before fall weather set in: Superintendent's and herdsman's houses, the poultry buildings, of which there are nine, including the administration building, main barn, horse barn, ice-house, implement and carriage shed, and new sheep barn. The latter two only received one coat. This added much to the appearance of the buildings and the Farm in general.

ELECTRIC LIGHT SYSTEM.

The electric light system, which was installed a year ago, has given great satisfaction and has been found much more convenient than the old system of oil lanterns, besides adding much to the appearance of the Farm buildings.

FENCING.

Some one hundred rods of Page wire fence was erected across the back of the 25-acre field, which was being cleared. Plain cedar posts, set at the distance of one rod apart, were used.

CLEARING LAND.

The greater portion of the land clearing during the past season was done by prisoners of war, who are interned in Amherst. They are brought out to the Farm by train in the morning and taken back at night under escort. Owing to their labour being voluntary the number varied from 75 to 200 per day. They worked from August 25 to December 16, as the weather permitted. Some sixteen acres of heavily stumped land was cleared, piled and burned, the greater portion being green stumps, hemlock, spruce, and hardwood. Five acres were chopped down out of green forest, part of which had been burned through with forest fire. Thirty acres of rough land was levelled with pick and shovel, making it ready for the plough; in fact, put in such shape as would have taken two or even three years by ploughing and harrowing. All material that would make wood or mine props was collected into piles and the green brush and waste wood was burnt off. Hence about 10 to 15 acres more are now ready for stumping next season.

WATER SYSTEM.

Owing to the old water pipes giving out and being too small to supply the necessary quantity of water, it was decided to put in a new line of pipes. Hence 4,500 feet of 2½-inch galvanized pipe was laid at an average depth of 5 feet, from the stable to the reservoir back in the woods. This work was all accomplished by the prisoners of war under the supervision of the Superintendent. The new system has given a plentiful supply of water, and is a great improvement over the old.

ROAD MAKING.

The road machine was put over the main road east and west of the Farm once and the split log drag several times during the season, thereby encouraging the upkeep of the public highway. All the main driveways on the Farm were also gone over several times during the season to keep them in shape and prevent the growth of noxious weeds.

LIVE-STOCK

A very successful year can be reported from the Farm in all experimental work with live-stock.

The grading up of a dairy herd from a bunch of common dairy cows by the use of pure-bred sires is being continued, and the results obtained are very interesting as well as encouraging. (See table of production under Division of Dairy Cattle, Experimental Farm, Nappan, in the detailed report on Animal Husbaudry). Owing to the increase in our dairy stock at this Farm, the number of steers fed was somewhat less than in previous years. However, a similar beef-feeding experiment to that conducted the three previous years was carried on with very satisfactory results. Sixteen steers were divided into two main groups, according to fleshing and type, into good butchers and good stockers. These were subdivided into heavy-fed and light-fed groups. Each of these in turn was further divided into lots receiving different rations. The profits per steer ranged from $10.98 to $16.13. The average weight of the sixteen steers was 1,300 pounds. The average profit for the ninety-three days test was $13.77. The average profit for three years, per steer, has been for the heavy fed $18.38, and for the light fed $22.39.

The pure-bred Shropshire flock has given very satisfactory returns during the past year. Three fine Shropshire rams were sold at $20 each and six nice ewe lambs added to the breeding flock.

The pure-bred swine herd has given most encouraging returns during the past season. Some four pure-bred Yorkshire boars, two Berkshire boars and two sows were sold during the season. The demand for breeders was not as great as in the previous year. Twenty-eight were fattened and sold as pork.

CEREALS AND ROOTS.

Twelve varieties of wheat were tested and ranged in yield from 22 to 34 bushels per acre; fifteen varieties of oats ranging from 44 to 75 bushels per acre; six varieties of six-row barley ranging from 32 to 45 bushels per acre and six varieties of two-row barley ranging from 40 to 45 bushels per acre.

Owing to the lateness of the season it was thought unprofitable to sow peas or field lots of mangels. Thirteen varieties of ensilage corn were sown and ranged in yield from 6 to 12½ tons per acre.

The root crop at this Farm was very unsatisfactory, owing to weather conditions and lateness of spring. Seventeen varieties of turnips were sown, giving an average yield of only 429 bushels per acre. Fourteen varieties of mangels averaged 256 bushels and 53 pounds per acre; and six kinds of carrots gave a yield of 140 bushels 58 pounds per acre. Sugar beets gave only fair returns. The three varieties averaged 201 bushels per acre. Notwithstanding the lateness of planting, the fifteen varieties of potatoes gave very satisfactory yields, ranging from 188 to 341 bushels per acre.

FIELD CROPS.

The total acreage of grain, not including test plots, was 15¼ acres, of which 9¾ acres was in oats, 2¾ in wheat, 1½ in barley, and 1¼ in mixed grain. The average yields were 36 bushels, 16 bushels, 29 bushels, and 28 bushels, respectively. In roots,

not including test plots, there was 12½ acres, all but 4 acres of which was in swedes. The remaining 4 acres was sown to Greystone (white turnip). On account of the land being so wet the crop was not more than half a one, the average yield being only 486 bushels 30 pounds per acre.

The hay crop was excellent, both on the upland and marsh, some 200 tons being cut. The average production on upland was 3 tons per acre, while on the marsh the average was 2 tons per acre.

FLOWERING PLANTS.

Many of the most popular varieties of plants, both in annuals and perennials, were tested out and these were the centre of attraction for most visitors. The old perennial border was removed and a new one started. Many of the leading varieties of rose bushes were planted in the fall.

VEGETABLES.

Numerous cultural tests were made with the leading varieties of vegetables.

APIARY.

A very successful year was experienced in the apiary work, there being an abundance of clover throughout the growing season.

POULTRY.

The poultry work is progressing most satisfactorily. A mass of data is being collected that will be of value to those interested in poultry raising.

FRUIT.

The apple crop was very good and was above the average in freedom from spots. All small fruits yielded fairly well and the young plantation, which was set out last spring, made good growth during the season.

MEETINGS ATTENDED AND ADDRESSED.

During the year the Superintendent gave addresses at the Maritime Winter Fair, Amherst, N.S., short courses held at Bathurst, N.B., and Sussex, N.B., Nappan School Garden Exhibition and East Leicester School Garden Exhibition; attended the Nova Scotia Farmers' Association, Windsor, N.S., and a Farmers' Co-operative meeting at Nappan; also judged the school gardens and exhibitions at Salem, West Leicester, East Leicester, Mansfield, Little River, and Nappan.

EXHIBITIONS.

An exhibit of farm produce grown at Nappan was put up at Halifax, September 8 to 16; Shubenacadie, September 22 to 24; Guysborough, September 28 to 29; Antigonish, September 30 to October 1 and at the Maritime Winter Fair, Amherst, N.S., December 6 to 10.

EXCURSIONS AND VISITORS.

There were eight picnics held at the Farm during the summer. The number of visitors recorded during the year was 2,064.

EXPERIMENTAL STATION, FREDERICTON, N.B.

THE SEASON.

The early winter was clear and cold, with scarcely any snow. In the latter part of December, 1914, it was intensely cold, the frost penetrating the bare ground to a greater depth than usual. January, February, and March were much milder than the average, the mean temperature for these months being 22.8 degrees against an average

for forty-two years of 18 degrees, but with less sunshine and only about half the usual precipitation. There was scarcely any snow on the fields at any time, and the ground was practically bare after March 9. April was, however, wet with only 102 hours of bright sunshine. May was more wet, with sixteen rainy days. June followed with twenty wet days. July had only fourteen days rainy but during one of them there was a precipitation of 3·26 inches, leaving pools of water standing on the already saturated ground and drowning out much crop. August had thirteen days on which rain fell, and up to September 1 the temperature was abnormally low. From May 1 to September 1 there was a rainfall of 19 inches compared with an average for these months for forty-one years of 14⅓ inches. These unusual weather conditions greatly hindered all agricultural operations and in some low-lying districts cropping was entirely prevented.

No frost was recorded at this Station after May 1, though the nights were very cool all through the summer. The first frost occurred on September 26 but was only noticeable in low places. Potatoes, corn, etc., were partially killed on October 2, but not generally until the 11th of that month. Considering the abnormal weather, most crops, except corn and potatoes, averaged up well.

METEOROLOGICAL RECORDS, 1915-16.

Months.	Temperatures.			Precipitation.	Bright Sunshine.
	Highest.	Lowest.	Mean.		
1915.	°	°	°	Inches.	Hours.
April	63	21	40·6	3·175	102·75
May	75	30	47·4	4·995	180·8
June	84	32	60·4	4·98	174·85
July	85	40	66·3	4·87	227·05
August	85	36·5	64·1	4·12	161·34
September	82·5	32	56·6	2·75	158·0
October	74	26	47·0	2·38	147·3
November	57	17	35·4	2·66	76·3
December	47	3	24·6	4·495	61·65
1916.					
January	43·5	−15	15·2	2·28	123·75
February	46·5	−22	12·9	3·1	114·0
March	69	−17	19·8	1·88	158·05
Total				41·685	1685·84

BUILDINGS.

On account of the destruction by fire of the pumping station, a temporary shelter had to be erected to cover the pumping plant and provide for the placing of casks at a sufficient elevation to give a gravity flow of water to houses and barns. This was later made frost proof to enable a continuance of the water supply during the winter. An implement shed, 30 feet wide by 117 feet long, on a concrete foundation, was built so as to extend the shelter to the farmyard from the westerly winds, and an outside cellar for seed potatoes and turnips was constructed. This latter was built entirely with farm labour and proved very satisfactory for its purpose. A cellar was also put beneath the dwelling-house on the Peters lot, and the house itself put in good repair.

FENCING AND DRAINING.

Six hundred and thirteen rods of woven wire fencing was erected, with cedar posts set one rod apart. One hundred and three posts were treated with crude oil (creosoted) by immersion in the hot oil for two hours before being set. Seventy-three rods of temporary woven wire fence was erected for fencing off crop from pasture, and 31 rods of temporary barbed wire for a like purpose.

Drainage was proceeded with steadily, approximately 30 acres being drained. Tile drains aggregated 23,460 feet, pole drains 1,905 feet, stone-filled drains 1,140 feet, and open ditches 5,626 feet, besides 20 acres temporarily drained by opening out dead furrows to carry off the surface water in the spring. A ditching plough was used to good purpose for deepening and sloping out dead furrows, in making open ditches and in road grading.

CLEARING LAND.

Approximately 40 acres of land were stumped and ploughed, and bushes were cut and burned over an area of 35 acres more. Boulders were broken up and hauled off land cleared last season, and large quantities of stone gathered and placed for road foundations, for the building of cellar walls, and for road embankment along the river side.

ROAD MAKING AND GRADING.

Turnpiking on 100 rods of highway was done, and the roadside graded to an even surface. Grading on the farm roads was carried on in spare time and the earth used for grading up the approach to the dairy barn. The roadsides, not already cleared, were stumped and ploughed, and some gravelling was done. The new entrance road was ditched and stone filled preparatory to macadamizing, and large quantities of field stone were deposited in the low places on the new farm road leading from the barns to the southerly boundary of the farm. Grading and filling was also done around the house now occupied by the Superintendent.

LIVE-STOCK

Out of the ten draught mares which were bred in 1914, five proved in foal. These included one pure-bred Clyde, two grade Clydes, and two grade Percherons. One of the grade Clyde mares had a breech presentation, and as it was impossible to deliver the foal without dissecting it the operation was necessarily severe upon the mare. She was under the direct charge of a veterinary, but died on the third day after the operation. The remaining four mares had fine strong foals and no accidents. These mares lost less than a week from their work, and the colts have done well. A grade Clyde filly at eleven months weighs 915 pounds, a pure-bred Clyde filly at same age, 820 pounds, a grade Percheron colt at eleven months and seven days 845 pounds, and a Percheron grade filly at ten months and nine days 800 pounds. A yearling Clyde grade gelding at twenty-three months weighs 1,180 pounds, and a yearling Percheron grade mare a few days younger weighs 1,165 pounds. A record of cost of feed of these colts is being kept with a view to showing the exact cost of production when they arrive at a marketable age. On account of having bred all the mares on the Station it was not considered advisable to keep any of them idle or put them on a no-grain winter ration. Most of the oats fed to horses this year were ground. Though no experiments as to cost of feeding between ground oats and whole grain were conducted, the economy in cutting hay and grinding grain against feeding long hay and whole oats seemed apparent.

A calf-feeding experiment was conducted for three months with sixteen dairy grade calves, beginning when the calves were approximately ten weeks old. Whole milk was compared with skim-milk and a home-mixed meal mixture, a proprietary calf

food and water, and the same proprietary food and skim-milk. The cost per pound of gain was: for whole milk, 11·5 cents; for skim milk and home-mixed grain, 5·7 cents; for calf food and water, 13·3 cents; and for calf food and skim-milk, 10·2 cents. These calves were fed till they were fourteen months old, and sold for beef, weighing alive, on an average at that age, 701½ pounds each.

On a ration common to all the cost per pound of gain from the end of the test to date of sale (276 days): for the whole milk lot was 6·5 cents; skim-milk and home-mixed grain lot, 7·3 cents; calf food and water lot, 5·9 cents; and calf food and skim-milk lot, 6·7 cents.

Twenty-four two- and three-year-old steers of very mixed breeding were put in to feed in November, some at a cost of 4¾ cents per pound and some at a cost of 5¾ cents. The intention was to test the value of corn ensilage versus roots, but, unfortunately, the ensilage this year seemed to lose all its natural heat and froze so deeply that it was impossible for a time to feed any ensilage at all, and the experiment had to be abandoned.

The pure-bred herds of Dairy Shorthorns, Ayrshires, and Holsteins were augmented during the year by natural increase and by the purchase of two Shorthorn cows, two Holstein cows, and an Ayrshire bull. These herds now number: Dairy Shorthorns, two bulls and six females, besides this season's calves; Ayrshires, one bull and six females, exclusive of this season's calves; and Holsteins, one bull and six females and calves. The Shorthorn cow "Jilt of Northlynd" gave 10,851 pounds milk during her last milking period. In the grading-up experiment from the cows bought in as representing cows kept by farmers not giving any attention to breeding for production, there are now ten grade Holstein heifers averaging about 12 months of age, that are a well-developed, milky-looking lot of heifers, very even in type and Holstein colour, This year's crop of calves from these nondescript cows is from the Dairy Shorthorn bull and shows an even type with Shorthorn characteristics.

POULTRY.

The wet and cold spring of 1915 was very unfavourable to poultry, fifty wet days being recorded during April, May and June.

The stock at the beginning of the season consisted of 76 Barred Rocks, 59 Wyandottes, 87 Rhode Island Reds, and 56 Leghorns.

The demand for eggs and poultry was brisk throughout the year. The number of eggs laid was 22,329, of which 8,715 were laid during the four winter months.

All the birds were trap-nested during nine months. The following table gives the results obtained from four pens:

Breed.	No. of birds.	Period of test.	Eggs laid.	Value.	Average earnings per bird for nine months.
Rhode Island Red	10	9 months.	1,182	$31 52	$3 15
Barred Plymouth Rock	10	9 "	1,118	29 81	2 98
White Leghorn	10	9 "	1,111	29 63	2 96
White Wyandotte	10	9 "	933	24 88	2 48

Four hundred and ten chicks were raised during the season, and 210 of the best retained.

The birds were fed oats in the morning, wheat at noon, and cracked corn at night. A dry mash consisting of 100 pounds bran, 100 pounds middlings, 100 pounds

corn meal, 50 pounds alfalfa, 25 pounds cottonseed meal, and 25 pounds oilcake (ground) was before them all the time. Grit, oyster shell, beef scrap and charcoal were at all times within reach. A small power green-bone cutter was installed and during the winter months green bone at the rate of one ounce per bird per day was fed to the layers and half an ounce per bird every other day was fed to the birds in the breeding pens.

In February, 1916, four breeding pens containing twenty-five of the best layers in each breed were mated up to good vigorous males whose respective mothers were known to be good layers.

APIARY.

The early part of the season, on account of the wet and cold, was very unfavourable for the apiary. The season improved considerably later. Seven hives were put into winter cases in the fall, and all colonies wintered well with the exception of No. 3 which, upon examination, was found to contain granulated honey.

Swarming was very troublesome during the entire season; four swarms were hived and the rest returned to the respective hives from which they issued. No. 10 colony gave the highest yield of honey, with 102½ pounds to its credit, while No. 2 produced no surplus. The average yield from the ten hives was 36·9 pounds. Eight colonies were put into winter cases and two into the bee-house for winter and, while an examination has not been made, owing to weather conditions, it is feared that three or four colonies have succumbed during the winter of 1915-16.

CROPS.

Much of the crop area was on land still in the rough, a good deal of it land yet undrained that needs draining for best results during a normal season and, with the very heavy precipitation of 1915, there could be but one result, viz., the drowning out of more or less of the crop. The very wet weather of the spring and the condition of the land also made seeding and planting late. Oats were seeded from May 21 till June 3, over an area of 245 acres, and the average yield was 24·1 bushels per acre. The oat plots for the testing of five varieties, four plots of each, of one-sixtieth of an acre each, gave an average yield of 56 bushels per acre. Five varieties of wheat in similar plots gave an average yield of 24 bushels per acre, and five varieties of barley an average of 40 bushels per acre. Five acres of buckwheat was badly drowned and gave only 10 bushels per acre. Twelve and a half acres of corn for ensilage purposes gave, approximately, 8 tons per acre of very immature stalks, and eighteen varieties on plots, including some very small-growing flint varieties that ripened, averaged 11 tons 133 pounds per acre. Eleven and a half acres of turnips gave an average yield of 890 bushels per acre, while nineteen varieties of turnips, on plots of one-twentieth of an acre each, gave an average yield of 1,110 bushels per acre. Seven varieties of feeding carrots on plots averaged 612 bushels per acre. Four varieties of sugar beets averaged 362·8 bushels per acre, and four varieties of mangels averaged 878 bushels per acre. Seven acres of potatoes, portions of which were not planted till the end of June and were more or less drowned out with standing water, averaged 190 bushels per acre. This crop was sprayed seven times with Bordeaux mixture, and the check rows left unsprayed showed when the yield was made up that the increased yield due to spraying was in field No. 1, Green Mountains, 84 bushels per acre; field No. 2, Green Mountains, 46 bushels per acre; Irish Cobblers, 62 bushels per acre; and the average increase on sixty-nine plots (about 4 acres) was 42 bushels per acre.

Peas, oats and barley were sown for green feed at the rate of 1⅓ bushels of peas, 2⅓ bushels oats, and ½ bushel of barley per acre, and gave splendid results. Oats 2 bushels, and vetch, 1 bushel per acre, were sown together and did well for the same purpose.

An acre of alfalfa was seeded. One-half of the acre divided longitudinally had 2 tons of ground limestone spread over it, and the acre was divided into thirds trans-

versely. The seed for one-third was treated with alfalfa nitro-culture. A ton of inoculated soil was spread over another third, and the remaining third was untreated. The alfalfa came well and the growth was even over the whole area. No results were observable on account of liming or inoculation, though from an inspection of the roots there did not seem to be quite so many nodules where seed or soil was not inoculated. There were, however, a considerable number of nodules on most roots examined in the untreated area. Alfalfa sown in 1914 gave three good cuttings, and seed was gathered from a portion of the second growth and also from the first growth. It was interesting to note that the second growth gave just as good a stand of seed plants as did the first growth, and they ripened simultaneously.

Plots of all the more common grasses and clovers were sown without any nurse crop. A good deal of attention had to be given to weeding these plots and also to weeding the acre of alfalfa. The most prevalent weed was mustard. Half the area of the grass and clover plots was cut and the hay removed, the other half was left standing to observe if there would be any difference in the wintering of the plants.

Between 55 and 60 acres of land produced hay. The crop harvested was 60 tons. The grass on a nearby farm was bought, and 40 tons of hay cut there. The balance of the hay required was bought outside and hauled to the barns by the Station teams, the price averaging $10 per ton. A considerable quantity of straw and wild hay was also bought for bedding purposes.

On May 26, 3,360 Kangaroo swede turnip roots were planted on one-third of an acre for seed production. The seed ripened very unevenly and sparrows took a large quantity before the bulk was considered ripe enough to cut and stook on August 28. One hundred and eighty pounds of an excellent sample of seed was threshed.

HORTICULTURE.

The same amount of land as last year, viz.: 17 acres, exclusive of potatoes, was devoted to horticultural work and, in addition, 6 acres more were broken up out of sod and cleared from stumps for lawn purposes. This latter portion will be worked level, roads constructed through it, and it will be seeded in 1916. A second perennial border 400 feet in length was established, and plantings of willow, spruce, and pine made in the shelter belt to the northwest of the garden. Twenty-seven species of hedge shrubs and trees were planted, some of them in rows 33 feet long and some in rows twice that length. The hedge rows were placed 15 feet apart.

All varieties of strawberries that did not grow in 1914 and come through the winter were re-set.

In the apple orchard one hundred and sixty trees, out of the eight hundred planted, were killed, mostly by root freezing. The absence of snow, and the severe cold winds in the more exposed portions of the orchard, were the evident cause, as in comparatively sheltered positions the trees came through without loss.

Varietal tests were made with all garden vegetables, and the fertilizer test begun in 1914 was continued. Here the experience of the previous year was confirmed in finding that 15 tons of barnyard manure per acre, valued at fifteen dollars, with from five to ten dollars worth of chemical fertilizers, gave generally much larger yields than where 30 tons of manure per acre, valued at thirty dollars, was applied.

Of the one hundred and fifty-two varieties of potatoes grown in 1914, thirty-two were discarded in 1915 as being either undesirable or duplicates of other varieties, and one hundred and twenty varieties were grown. A great difference in the disease-resistant qualities of different varieties was noted. While the ground on which the variety rows were planted was fairly uniform in regard to drainage, some rows suffered more than others from wet, and yields recorded might have been different under absolutely fair soil conditions. A test of the value of hill selection was attempted with twenty varieties, but the wet weather and uneven ground surface causing the drowning out

of irregular portions of the test rows prevented the obtaining of any conclusions from this test.

Work done by the Division of Botany in the study of potato diseases was carried on in connection with the general potato crops of this Station, and an isolated 4 acres of land was set apart for special investigational work with powdery scab, club root, etc.

FERTILIZER EXPERIMENTS.

This work, in a general way, was carried on with the root crops, potatoes, and oats and in addition, a permanent area of plots was laid off for a systematic investigation to determine the amounts of chemical ingredients of fertilizers per acre which may be expected to give the most profitable crops.

In a test with basic slag applied to the turnip crop on land which had been manured in 1914, for a corn crop, with sixteen loads of barnyard manure per acre it was found that Magnum Bonum swede turnips without any manure or fertilizer whatever gave 523·6 bushels per acre, and immediately alongside under the same soil and previous fertilizing conditions the application of 500 pounds of basic slag per acre increased the yield of turnips to 698·7 bushels per acre, an increase worth, at 10 cents per bushel, $17.50, while the slag applied cost $3.75.

In continuing the test of relative value of nitrate of soda and sulphate of ammonia versus fish scrap, this year on oats following potatoes, fish scrap gave 2·6 bushels of oats per acre less than the chemicals; while with basic slag versus acid phosphate, basic slag gave an increase of 13·5 bushels of oats per acre over acid phosphate.

In quantity of fertilizer per acre with oats following potatoes, an application of 500 pounds of 4-8-10 mixture, applied in 1914, and 250 pounds of the same direct to the oats in 1915 gave 49·7 bushels per acre. An application of 1,000 pounds of a similar mixture applied in 1914, and 500 pounds applied in 1915, gave 55·5 bushels per acre.

On the seventy-eight permanent fertilizer plots a systematic series of varying amounts and different combinations of nitrogen, phosphoric acid, and potash, with and without barnyard manure, was tested with a potato crop. Dried ground seaweed was also tested as a possible source of potash. On account of the material not being available until late in June, the seaweed test was not a very fair one. With potatoes, 1,000 pounds of the ground dried seaweed per acre gave a yield of 129 bushels, and a complete mixed fertilizer at the same rate gave 158 bushels. With turnips the seaweed fertilizer only gave 105·6 bushels per acre against 481·6 bushels from the complete fertilizer.

MEETINGS AND ADDRESSES.

The Superintendent was asked to assist at the short course work conducted by the New Brunswick Department of Agriculture, and assisted in the live-stock work at Bathurst on December 15, at Sussex on January 16, and at Woodstock at the Potato Growers' Convention on March 22 and 23 and again at Woodstock on March 27, 28, and 29. A Shorthorn bull and cow and three feeding steers were taken from the Station to demonstrate the live-stock work on the last-named date. Addresses were also given before the annual meeting of the Farmers' and Dairymen's Association of New Brunswick at Fredericton on March 1. On March 2 all the members of the Farmers' and Dairymen's Association visited the Station, where dinner was served to them. The stock on the Station was used for demonstration work. Horse judging was demonstrated by Principal Cumming of the Nova Scotia Agricultural College, and cattle judging by Professor Barton of Macdonald College.

Seventy-nine samples of seed potatoes were sent out, and some breeding poultry and eggs sold. An increasing number of inquiries upon all sorts of agricultural matters are being received and answered.

EXPERIMENTAL STATION, STE. ANNE DE LA POCATIERE, QUE.

THE SEASON.

The spring of 1915 was very late, wet and cold. No work on the land was possible until May 15, and seeding did not commence on this Station until the 21st of that month, about two weeks later than usual. The last spring frost was registered June 2, and was sufficient to do a small amount of damage to the few vegetables planted in this district at that date. Growth was very slow in May, the soil being so cold that two weeks elapsed after sowing before the grain appeared above the ground, and the flowering of the fruit trees was also two weeks late. The total precipitation during the season would have been sufficient, but lack of rain at the right time caused the hay crop to be reduced by at least a third below the average. Potatoes and field crops, as well as hay and pasture, suffered because of the dry weather at the end of June and in July. Grain was less affected by this; wheat, oats, and field peas gave a good crop of good grain, especially on the regular rotations. The crop of ensilage corn was the best in the last four years, and was put in the silo in very good condition at the end of September. The first damaging frost occurred October 7. Harvesting the grain was made difficult because of frequent rains in September and the beginning of October. To sum up, the crops were harvested in good condition, though a little late.

METEOROLOGICAL RECORDS, 1915-16.

Month.	Temperature F.					Precipitation.					Hours of Sunshine.
	Date.	Maximum.	Date.	Minimum.	Mean.	Rain.	Snow.	Total.	Number of days.		
		°		°	°	in.	in.	in.	rain.	snow.	
April	23	59·2	5	15·0	39·16	2·07	.....	2·07	8	.....	181·4
May	23	69·0	14	29·4	48·6	3·86	1	3·96	10	1	199·2
June	19	83·4	2	32·4	57·9	2·30	.....	2·30	9	.....	266·8
July	31	86·4	21	43·2	64·39	1·81	.....	1·81	8	....	254·2
August	12	85·2	6	44·6	61·77	3·05	.....	3·05	10	.....	195·3
September	15	84·4	26	34·2	55·73	3·85	.....	3·85	13	.....	184·5
October	13	67·0	11	26·4	46·03	2·20	.....	2·20	8	.....	122·3
November	2	47·0	23	17·2	32·13	1·07	6	1·67	9	5	95·2
December	4	34·0	31	−10·4	20·9	0·40	15	1·90	2	8	65·8
1916.											
January	2	41·2	15	−18·2	11·42	0·52	19	2·42	4	9	82·3
February	1	37·2	21	−22·4	9·0	0·58	20	2·58	2	7	112·8
March	30	44·2	15	−10·2	13·06	.....	15	1·50	.....	5	212·8
Total	.....	.....	.....	.....	.....	21·71	76	29·31	83	35	1,972·6

NOTE.—10 inches of snow are equivalent to 1 inch of rain.

FIELD HUSBANDRY.

The principal work in field husbandry was rotation of crops and the destruction of couch grass infesting the greater part of the clayey land. The greatest attention is given to the perfect cultivation of the clayey land that forms the greater part of the arable area of this Station. The couch grass and other weeds have been eradicated on all the area used for crop rotations. The increased yields, as well as the quality of the products of a good system of cultivation, the many advantages that offer from a variety

of crops on a farm, encourage ever-increasing attention to methods of soil culture and choice of crops at this Station. No farm operations are more important than the introduction of suitable crop rotations, as, in this way, each foot of land cleared can be submitted to a definite process.

CEREALS.

The area of cultivated land at this Station does not as yet permit of making variety tests of grain, but the work of drainage and removing stones that is being carried on here will soon allow a reasonable area to be devoted to this purpose. In the meantime, the best varieties of wheat, barley, oats, and peas are sown on all the regular rotations.

FORAGE PLANTS.

The following varieties of forage plants were tested: fifteen varieties of turnips (rutabaga), thirteen varieties of beets for forage, seven varieties of carrots, and fourteen varieties of field corn. Of the varieties of the latter tried, Quebec and Canada Yellow ripened.

VEGETABLES.

Two hundred and twenty-four varieties of vegetables were cultivated at Ste. Anne last season. Numerous experiments were tried as to the adaptability of different varieties and different cultural methods were compared. Six different methods of sowing and cultivating potatoes were used. These experiments were made in order to compare results from sowing at different distances between the hills, different distances between the rows, sowing whole tubers, or potatoes cut to one, two or three eyes. The seed was also sown at different depths, and submitted to different methods of cultivation. Practical conclusions will be deduced from these tests.

In co-operation with, and under the direction of the Dominion Botanist, one-twentieth of an acre of potatoes infected with powdery scab was grown in order to determine the best method of eliminating this disease.

TOBACCO.

Three varieties of tobacco were planted on one-twentieth of an acre. The leaves of each variety ripened, and gave a satisfactory crop.

FRUITS.

One hundred and thirty-two fruit trees were planted in the spring in order to complete an orchard of ten acres. This orchard contains 668 apple trees, 209 plum trees, 81 cherry trees, and 19 pear trees; representing the following varieties: 115 varieties of apples, 30 of plums, 15 of cherries, and 8 of pears. The cultivation of small fruits to the number of 320 plants, as well as 224 varieties of vegetables, is carried on between the rows of trees in order to make use of the spare ground. Different cultural methods are used and different plants are grown in the remainder of the orchard, in order to find the best methods and best plants to use there.

HORSES.

There is a registered Canadian mare, which is used as a driver and for light work, at this Station, and also five teams of work horses, averaging in weight from 2,700 to 3,400 pound per team. These horses are used for most of the farm work.

CATTLE.

A good bull and twelve Ayrshire cows form the pure-bred herd here. There are also two two-year-old heifers, four yearling heifers, and two yearling bulls of the same breed. The herd of cross-bred cows consists of twelve milkers, three yearlings, and four heifers.

SHEEP.

Three yearling ewes were bought in the district, in order to commence the grading of the flock of crossed ewes with a pure-bred ram. These ewes were mated with a very good Shropshire ram.

HOGS.

There are three good sows and a good Yorkshire boar at this Station. Two young boars and two young sows were sold for breeding purposes during the year, as well as 3,900 pounds of fat pigs.

POULTRY AND BEES.

In November last, one hundred White Wyandottes were put into a poultry-house 16 feet by 32 feet that had just been built.

Thirty colonies of bees were wintered well in the cellar. Four colonies wintered as well as could be wished under a shelter made of one-inch boards. One very remarkable fact was that the colonies wintered outside consumed, on an average, 3 pounds of food less than those wintered in the cellar. The yield of honey was 2,315 pounds, or an average of 68 pounds per colony. The highest yield was 116 pounds from one of the colonies wintered outside.

IMPROVEMENTS.

Six acres of new land were drained in the course of the last season. Some open drains were made, and others widened at different places where necessary. More than 28,000 feet of drains were dug on 17 acres last season. A great quantity of stone scattered in the field has been picked up and used for various purposes. The main roads here were improved and gravelled. The municipality also greatly improved a road running the length of the Station. The Station roads are certainly the best in the district.

BUILDINGS.

A wagon-shed and granary combined, the dimensions of which are 117 by 30 by 18 feet was constructed at this Station last year. An administration building 18 by 26 feet, containing two storeys and a good cement cellar for incubation; a permanent poultry house, 16 feet by 32 feet, and six portable colony houses 8 feet by 12 feet constructed last autumn meet the needs of the poultry plant.

EXHIBITIONS.

The best products of the Station were shown at the exhibitions of Montmagny and Ste. Anne de la Pocatière last September, as well as at the exhibitions of seed grain at Montmagny and Isle Verte last March. The demonstration materials furnished by the Central Farm helped to enhance the appearance of the local exhibits, and were also of practical educational value to the farmers

VISITORS.

More than 2,500 farmers visited this Station during the past year. They were particularly numerous on the occasion of a reunion organized on August 24, during the short course of the College of Agriculture, and while the exhibition was being held at Ste. Anne.

JOURNEYS MADE.

The Superintendent visited the Illustration Stations at St. Charles de Bellechasse and Baie St. Paul, and also assisted the Supervisor of these stations when he visited Causapscal, Rimouski, and Dorchester.

SESSIONAL PAPER No. 16

EXPERIMENTAL STATION, CAP ROUGE, QUE.

THE SEASON.

The months of May, June, July, August, and September were a little warmer, dryer, and duller than the average of the past three years, the mean temperature being 1·07 degrees higher, the precipitation 0·67 inch less, and the number of hours of sunshine 5·2 fewer than during 1912-13-14. The last killing frost occurred on May 16, and the first one on October 23, which made the growing season about thirty days longer than usual. Cereals were better than they have been for a long time; corn for silage and swedes were a little above, and hay somewhat below, the average of the last five years. In fruit, apples and cherries were a medium crop; plums and strawberries were very good; whilst currants, gooseberries, and especially raspberries were much affected by the drought of midsummer. Amongst vegetables, tomatoes and cucumbers were extra; cabbage, cauliflower, celery were good; and melons, beets, carrots, parsnips, salsify, leeks and onions were only medium, on account of the dry weather. Ornamental shrubs and hedges made a fine growth, but lawns were brown during the latter part of July and August; flowering plants did well, with blooms somewhat smaller than usual.

Meteorological Records, 1915-16.

Month.	Temperature F.			Precipitation.				Total Sunshine.
	Highest.	Lowest.	Mean.	Rainfall.	Snowfall.	Total.	Heaviest in 24 hrs.	
1915.	°	°	°	Inches.	Inches.	Inches.	Inches.	Hours.
April	71	20·2	40·18	2·04	.....	2·04	0·54	178·6
May	76	31·2	48·20	3·14	.....	3·14	0·90	205·7
June	85	38·2	60·54	2·63	.....	2·63	0·93	225·0
July	85	46·2	64·65	1·68	.....	1·68	0·72	246·9
August	87	35·2	63·71	3·39	.....	3·39	0·64	162·8
September	84	32·2	56·95	5·31	.....	5·31	2·90	163·9
October	68	27·2	46·11	3 06	.....	3·06	0·90	107·8
November	50	19·2	32·60	1·93	2·5	2·18	0·40	73·6
December	40	− 3·1	21·09	.....	28·3	2·83	0·60	36·2
1916.								
January	44	−16·9	12·56	1·80	30·4	4·84	0·90	51·5
February	36	−26·8	10·40	0·75	22·5	3·00	0·60	88·9
March	45	−10·0	15·31	.....	9·0	0·90	0·40	212·6
				25·73	92·7	35·00	.....	1,753·5

LIVE-STOCK

All the live-stock kept in good condition during the year.

HORSES.

There are twenty horses at the Station: fifteen registered French Canadians,—eleven mares, a two-year-old stallion, a yearling colt, two weanling fillies—also two teams of from 2,600 to 2,900 pounds, and a driver. They are kept for work, experimental feeding, experimental housing, and to sell high-class breeders at reasonable prices.

Work.—During the twelve months, each horse averaged a little over two hundred working days of ten hours. This is fairly good, taking into consideration the fact that there were seven brood mares and two 3-year-old fillies in the lot.

Experimental Feeding—Wintering an idle horse at low cost.—With one pound each of rough hay, oat straw, and roots per hundred pounds live weight, an 18-year-old mare weighing 1,385 pounds on November 1, 1915, was kept for $14.51 until March 31, 1916, when she tipped the scales at 1,410. A gelding of the same age cost $13.95 and gained 5 pounds. The results of five years show that seven different horses of an average weight of 1,280 pounds were fed during 151 days each at a daily cost of about 9½ cents, valuing rough hay, oat straw, and roots respectively at $7, $4, and $2 per ton.

Experimental Feeding—Cost of raising horses.—The aim is to find out how much it costs to raise horses until they are ready to work. Valuing hay at $7 per ton, oats, bran, whole milk, skim-milk at 1½, 1, 1½, and one-fifth cent per pound, it cost $161 to feed a young stallion from the time he was weaned, at five months, until he was 34 months old. Nothing was spared to push the development of the colt to the utmost. The average weight of his sire and dam is about 1,075 pounds, and he tipped the scales at 1,190 when 34 months old.

A colt born on June 11, 1914, cost $59.78 when 21 months and 20 days old, while two fillies dropped, respectively, on June 10 and 28, 1915, each cost $19.35 when 277 and 295 days old.

Experimental Housing.—During the last four winters, seven different colts have been kept outside with only single-boarded sheds as shelters, and with the temperature coming down as low as 31° F. below zero. Though one of these was dropped on July 31 and weaned on December 31, not one of them even shivered.

CATTLE.

The herd comprises thirty-six head, thirty of which are pure-bred and six grade French Canadians. There are three bulls—two aged and a calf—seventeen cows, fifteen heifers, and one heifer calf. These cattle are kept to supply milk to the dairy, and for experimental breeding and feeding.

Milk production.—Eleven cows from 4 to 11 years of age finished their lactation periods and averaged 6,354 pounds of milk testing 4·32, which is equivalent to 323 pounds of butter. Whilst these figures are not phenomenal, they show a substantial profit over cost of feed.

Experimental breeding.—The nine grade cows bought for experimental breeding were kept for two or more periods of lactation, and have been sent to the butcher with the exception of one. All the heifers dropped by these cows from the service of scrub bulls previous to their purchase were poor milkers and had to be sold for beef. Now, if these cows had been left in the herds where they came from, not only, with minor exceptions, would they not have given enough milk to pay for their board, but they would, in every case, have produced unprofitable progeny.

The heifers out of these cows, and by the Station's pure-bred bull, are being kept in the herd. It will be interesting to see how they will milk, and what their progeny will be like.

Experimental Feeding—Best quantities of meal to feed.—An experiment was begun in 1913 and continued in 1914 and 1915 with three lots of cows of about the same weight whose previous lactation record and date of calving placed them on about an equal footing. Each lot received exactly the same quantity of roughage—hay, ensilage, swedes—whilst one lot ate as much meal as they could clean up, which averaged 1 pound per 2·19 pounds of milk for the three years; another received 1 pound of meal per 4 pounds of milk, and the last bunch got 1 pound of meal per 8 pounds of milk. The experiment lasted from the beginning of November to the end of March each year, and resulted in more profit from the unlimited meal lot than from the others. The food values were: meal 1¼ cents per pound, roots and

ensilage, $2 per ton; hay, $7 per ton. Butter was calculated at 28 cents per pound and skim-milk at 20 cents per hundredweight. Labour, interest, depreciation, manure, and calves were neglected.

Experimental Feeding—Cost of raising heifers.—The idea is to find out how much it costs to raise heifers until calving age. The food given to three calves dropped in 1914 was weighed, and it cost, on an average, $52.39 to bring them to 18 months and 10 days. This will be continued during 1916. In 1915, a calf was fed until 11 months and 2 days for $28.32. The following prices were set: whole milk, $1.50 per hundredweight; skim-milk, 20 cents per hundred-weight; meal, 1½ cents per pound; hay, $7 per ton; roots, $2 per ton.

Selling breeders at reasonable prices.—There are now in the herd eleven French Canadian cows which have qualified for Record of Performance, which is a larger number than that possessed by any individual, firm, or other public institution in Canada. Amongst the lot is the champion 3-year-old of the breed. The most rigid weeding is done, and stock bought at this Station cannot help but improve the dairy cattle of the district.

SHEEP.

The flock is composed of a Leicester ram and twenty ewes, all pure-bred. On account of lack of accommodation, no breeding or feeding experiment has yet been undertaken.

POULTRY.

Barred Rocks only are kept. A couple of hundred hens were wintered, but this number will be brought up to three hundred in 1916.

Temperature in wide vs. narrow house.—Two cotton-front shed-roof houses for 100 hens each have been built on exactly the same lines and have the same floor space, the only difference being that one is 16 feet wide and the other only 12. By the aid of maximum and minimum thermometers, it has been found that, from November 26, 1915, to March 31, 1916, the extreme weekly range of temperature was 38·69° F. outside, 14·06° in the narrow house, and 11·87° in the wide house.

Winter layers of different ages.—Four lots of twenty-five birds each were housed in one building where conditions were uniform: 1, hens two years and over; 2, yearling hens; 3, pullets hatched before May 15; 4, pullets hatched after May 15. The early pullets produced eggs at a cost of 16·7 cents per dozen; the late pullets, 28·2 cents per dozen; the yearling hens, 95 cents per dozen; and the old hens $8.76 per dozen.

BEES.

The bees kept at this Station are Italians, with three or four colonies of hybrids. The average production of honey per colony was 44·28 pounds, and it sold at 15·24 cents per pound.

FIELD HUSBANDRY.

Under this head come crop management and agricultural engineering.

Crop Management.

This comprises crop yields, cost of production of field crops, rotation of crops, and experimental work.

Crop yields.—These were as follows, per acre: Corn, 8 tons 1,264 pounds; swedes, 18 tons 545 pounds; oats, 71 bushels 6 pounds; barley, 27 bushels 5 pounds; wheat, 22 bushels 22 pounds; peas, 18 bushels 14 pounds; clover hay, 1 ton 1,085 pounds; timothy, 1 ton 923 pounds.

Cost of production of field crops.—Records were kept of the cost of production of the three main crops of the district, swedes, oats, and hay, on 18 acres of land. It cost $2.24 to produce a ton of the first, 20 cents to produce a bushel of the second, and $7.45 to produce a ton of the third.

Rotation of crops.—Three rotations have been compared since 1911: 1, three-year, swedes, oats, clover; 2, four-year, swedes, oats, clover, timothy; 3, six-year, swedes, oats, hay, hay, hay, hay. Nothing definite has yet been reached but one thing certain is that the cost per acre has only increased 3½ per cent during five years, whilst the returns increased 42 per cent.

Planting fodder corn in drills vs. hills.—All corn grown on 57·3 acres, during five years, was weighed. When sown in drills 48 inches apart and 8 inches in the row, it averaged 10 tons 759 pounds per acre; in drills 42 inches apart and 8 inches in the row, 10 tons 185 pounds; in hills 36 inches apart in all directions, 6 tons 402 pounds; in hills 42 inches apart in all directions, 6 tons 358 pounds.

Rates of seeding oats.—Thirteen different rates of seeding oats, from 1 to 4 bushels per acre, have been tried during the last three years, with the result that the six rates above 2½ bushels averaged 60 bushels 13½ pounds per acre, whilst the six rates below 2½ bushels only averaged 53 bushels 2½ pounds per acre.

Rates of seeding clover and timothy.—Over sixty one-sixtieth acre plots have been used for this experiment for the past four years. On a number of them, 12 pounds timothy, 8 pounds red clover, and 2 pounds alsike was used per acre; whilst on the others only half of these quantities was sown. The average of three years shows an advantage of 20 per cent for the heavy seeding.

Yield of hay with different nurse crops.—Since 1912, inclusively, 139 plots of one-sixtieth acre each were sown with peas, barley, wheat, oats, with a mixture of 12 pounds timothy, 8 pounds red clover and 2 pounds alsike per acre. The yield of hay was 3,622 pounds per acre after peas, 3,394 after barley, 3,210 after wheat, and 2,636 after oats.

Agricultural Engineering.

A good deal of work was done at this Station during 1915 in draining, fencing, road making, and adding to the waterworks system.

Draining.—Practically all the farm is now drained, and 7,575 feet of tiles were laid during the season.

Fencing.—All the poultry area, a paddock for horses, the orchards, and the entrance to the Station were fenced, a total length of 7,870 feet being erected.

Road Making.—The half mile of macadam was practically completed in front of the Station, so that all the road to Quebec city is now smooth surfaced. Much work was also done lowering the entrance to the Farm, and grading past the horse barn.

Waterworks.—The system is all completed with the exception of the part leading to the workshop and the poultry buildings. Hydrants have been placed at different points, 400 feet of 2-inch hose was bought, and every man on the Station was put through a fire drill.

FERTILIZERS.

Five acres are devoted to experiments with fertilizers, and two investigations are being made: (*a*) to find the most effective formula, and (*b*) to find the most effective elements in a mixture. A three-year rotation is used, potatoes, oats, clover, so that information will be gathered, not only on the effect of the fertilizer the year of its application but also about the residual effects on grain and hay. In the first experiment, it was found that on a clayey loam such as was used here, potash was the

least important of the main elements required to increase the yield of potatoes. Of all formulæ used, the 2-2-1 gave the best results. In the second experiment, the forms of nitrogen and phosphoric acid which were the most readily available, nitrate of soda and superphosphate, gave the best results. It will be interesting, though, to see what the slower available forms, such as sulphate of ammonia and basic slag, will do for the oats and the clover in 1916 and 1917.

CEREALS.

Investigations with grain comprise: (1) tests of varieties, (2) selection of best strains, (3) production of seed under field conditions, (4) comparison of different mixtures, (5) growing of grain for hay production.

Variety Tests.

Eight varieties of spring wheat were tested and Huron was the head as for the last five years; six varieties of oats were on trial, and Banner, as usual, was the best yielder; five varieties of field peas were tried with the result that Arthur is a good first, as an average, since 1911; five varieties of barley were in the plots, and Manchurian is recommended.

Selection of Best Strains.

Work was continued in isolating, by selection, the best strains of Banner oats, Huron wheat, Manchurian barley, and Arthur peas. This is done by the well-known head-row method.

Production of Seed Under Field Conditions.

A couple of acres each of Arthur peas, Manchurian barley, Huron wheat, and from 10 to 20 acres of Banner oats are grown each year with the utmost care for seed purposes. They were sold at $1 per 34 pounds for the oats, $2.50 per 60 pounds for the peas, $1.75 per 60 pounds for the wheat, and $1.50 per 48 pounds for the barley. There is a demand for more than is offered at these prices.

Comparison of Different Mixtures.

Different mixtures of barley and oats, wheat and oats, barley, oats and wheat were tried but in 1915 they did not yield more grain than the single varieties.

Growing Grain for Hay Production.

For tonnage, oats alone produced more than oats and peas, oats and vetches, or oats, peas, and vetches. But according to analysis, as per tables in Henry's "Feeds and Feeding," the oats and vetches gave the most digestible nutrients per acre.

FORAGE CROPS.

Investigations with forage crops consist in variety tests and in selection of good strains.

Variety Tests.

Fifteen varieties of corn for silage were tested, and Longfellow seems to be the best adapted to this district; fifteen varieties of swedes were on trial, and Good Luck is the best yielder, for an average of five years; ten varieties of mangels, seven of carrots, and three of sugar beets were in the plots, and the ones which are recommended are Giant Yellow Intermediate amongst the first, Improved Short White amongst the second, and Klein Wanzleben amongst the third.

Selection of Good Strains.

Hardy strains are being selected of Kentucky blue grass, meadow fescue, orchard grass, perennial rye grass, red top, sheep fescue, timothy, Western rye grass, alfalfa, alsike, red clover. Early families of Quebec Yellow corn are isolated by the head-row method.

HORTICULTURE.

Investigations in horticulture relate to fruit, vegetables, and ornamental plants, and consist of: (*a*) testing varieties for earliness, yield, quantity, hardiness, and beauty; (*b*) cultural experiments; and (*c*) the propagation of the best varieties. There are 12·93 acres in fruit, 3·96 acres in vegetables, whilst the ornamental grounds cover an area of 3·48 acres.

Testing varieties.—The following number of varieties were tested in 1915: 142 apples, 15 cherries, 3 pears, 40 plums, 28 grapes, 16 black currants, 12 red currants, 3 white currants, 12 gooseberries, 10 raspberries, 32 strawberries, 22 potatoes, 265 vegetables, and 1,426 ornamental plants, annuals, perennials, shrubs, and trees.

Propagation of the best varieties.—Seed of a large number of varieties of vegetables and flowering plants has been successfully produced, and a great many fruit seedlings are grown, besides the grafted stock. In some cases, garden peas for instance, the home-grown seed has shown an increase of crop of 32 per cent over that produced from seed bought from five of the best known seedsmen of England and the United States.

TOBACCO.

One-eighth of an acre was grown of Canelle, Comstock and Petit Havanne. Whilst the last is earlier than the others, it is not a high enough yielder and will be discontinued.

EXTENSION AND PUBLICITY.

Great pains are taken to let farmers know the results of the experiments undertaken for them on the various Farms of the system. Over four thousand names were furnished for the mailing lists during the year, and a great many bulletins sent out from the Station.

Exhibitions.—Exhibits were made at Three Rivers, at Quebec, and at four county shows, and material was sent to four New England fairs through the Quebec representative of the Department of the Interior. At Three Rivers and at Quebec two diplomas were awarded, whilst a special first-prize ribbon was given by each of the New England fairs. The exhibits consisted of grain, forage crops, fruit, vegetables, flowers, honey, besides different models of buildings, silos, hotbeds, etc.

BUILDINGS.

A wagon shed, 100 feet by 25 feet was built, also a poultry house for 100 hens, and a brooder for 700 chicks. The old piggery was partly remodelled into a modern and commodious sheep barn, and various repairs of a minor nature were made.

EXPERIMENTAL STATION, LENNOXVILLE, QUE.

THE SEASON.

The light snowfall of the winter of 1914-15 left the ground much exposed, and frost entered to quite a depth, making conditions very unfavourable for the clover crop.

Seeding was commenced on April 23, with weather quite cool and little sunshine. The wet season which prevailed during the months of May, June, and July, precipi-

tation amounting to 8·67 inches, made conditions more favourable for hay, roots, and grain crops than for corn; but with the bright, warm weather of August and September, this important forage crop came on wonderfully. The fall of 1915 was quite late, operations such as drainage, gravelling, levelling, and road work being carried on until the first week in December.

The weather during the winter of 1915-16 was comparatively cold, especially during February and the first part of March. During the last days of March the weather warmed up and wheels were used for the first time on the 28th.

The lowest temperature recorded during the year was −35° on February 14 and the highest on September 15, registering 89°.

METEOROLOGICAL RECORDS, 1915-16.

Month.	Temperature F.					Precipitation.					Total Sunshine.
	Maximum.		Minimum.		Mean.	Rainfall.		Snowfall.		Total.	
1915.	Date.	Deg.	Date	Deg.	Deg.	Days.	Ins.	Days.	Ins.	Ins.	Hours.
April	26	79	5	16	44·5	6	1·84	.....	.....	1·84	171·4
May	12	82	15	26	48·8	9	1·72	.....	.....	1·72	201·5
June	5	85	3	31	58·8	15	2·06	....	.....	2·06	249·5
July	31	87	11	43	63·7	12	4·89	.....	.....	4·89	215
August	12	85	28	30	63·1	12	3·47	.....	.....	3·47	76·5
September	15	89	31	25	57·1	10	2·70	.....	.....	2·70	179·4
October	13	73	25	19	46·1	9	3·45	....	.....	3·45	113·9
November	1	59	19	13	33·7	10	2·12	.....	.....	2·12	94·8
December	25	42	23	0	24	1	·67	7	22·6	2·93	22
1916.											
January	28	49	8	−28	20	4	1·14	8	24·9	3·63	61·5
February	1	46	14	−35	11·6	3	·88	7	15·5	2·43	83
March	29	58	12	−22	15·4	.....	.....	7	16·0	1·60	197·3
							24·94	.....	79·0	32·84	1,665·8

ENLARGEMENT OF THE STATION.

In the fall of 1915, approximately 13 acres of land belonging to Bishop's College corporation was acquired, which allowed the western boundary of the farm to extend in a straight line to the St. Francis river, giving 701 feet more frontage on said river.

LIVE STOCK.

Horses.—This Station now has seventeen horses; six registered Clydesdale mares, nine well-graded horses, one driver, and one registered Clydesdale colt dropped September 1, 1914, which at the present time has attained a weight of 1,135 pounds.

An experiment in the economical wintering of idle horses was carried on; one pair were fed 20 pounds of roots and 27 pounds of hay each, per day; the other pair fed 4 pounds of oats, 2 pounds of bran, and 7 pounds of hay each, per day.

The results of these experiments will be found in the Animal Husbandry report.

Cattle.—During the fall of 1915, ninety-two head of feeding steers were purchased to consume the roughages, such as silage and hay produced on the farm, and with which the following experiments are being conducted: Loose *vs* tied; heavy *vs* light grain ration; possible profits of steer feeding.

Up to the present time these cattle have not been disposed of; therefore, results of experiments cannot be given.

Sheep.—There are now at this Station sixty sheep, nine of which are registered Oxford ewes, one registered Oxford ram, forty common grade ewes, with which grading experiments are being conducted, and ten shearling ewes selected from the flock of lambs raised from this flock last year.

Reports of experiments conducted with sheep and lambs will be found in the Animal Husbandry report.

FORAGE CROPS.

Roots.—Seventeen varieties of swedes, twelve of mangels, seven of carrots, and three of sugar beets were tested out in duplicate plots of one-one-hundredth acre each. These were planted with two check rows at the ends and also between each kind of root, so that each variety had the same room and light.

Indian Corn.—Seventeen varieties of Indian corn were tested out for silage purposes on duplicate plots of one-one-hundredth acre each. The three varieties which yielded the best this year were Compton's Early, Salzer's North Dakota, and Early Longfellow. Tabulated reports of these tests will be found in the report of the Division of Forage Plants.

Grasses and Clovers.—Eight varieties of grasses, two of clovers, and one of Grimm's alfalfa are being tested out in check plots of one-eightieth acre each, to ascertain their value in hardiness, feeding qualities and hay and seed production.

Seed Production.—A small area was devoted to this work from which a small quantity of swede and mangel seed was produced. Very little work of this nature is being conducted in this district so far.

HORTICULTURE.

In the spring of 1915 the cultural and variety orchards were set out under the direction of the Horticultural Division of the Central Farm. Among the tree fruits planted out were apples, plums, pears, and cherries; also a large variety of small fruits consisting of strawberries, currants, raspberries, and gooseberries. One-half acre was set apart for the testing out of different varieties of grapes.

Cultural and variety tests were also conducted with the leading vegetables, as well as with perennial and annual flowers.

FIELD HUSBANDRY.

Rotation work has not yet been started on this Station.

The yield of hay for the season 1915 was above the average. The grain crops, especially oats, were of a very strong growth. A very severe storm occurred before ripening, which lodged a portion of this crop in this district. The oats had to be cut and dried for hay or put into the silo. The yield of oats was approximately 53 bushels per acre.

One hundred and seventy-five pounds of red clover seed was harvested from the second crop in the fall of 1915. This is a branch of work which will be given far more attention in this district in the future.

Fencing.

Four hundred rods of No. 9 galvanized wire fence was put up on the public and farm roads and other parts of the farm during the summer and fall, and all fences built since the farm was established were painted.

Drainage.

During the season of 1915, 55,000 feet or over 10 miles in length of tiles were laid in various parts of the farm. The tiles chiefly used were 4-inch, although in some places 3-inch were found sufficiently large. One hundred rods of open drain was also dug.

Roads.

The public road leading towards the brick-yard from the Cookshire-Eaton road, a distance of one-half mile, was graded, straightened and gravelled, also the road running through the College property. The farm road running south from the public road, through the R. W. Reid farm was gravelled.

Clearing Land.

The land which was acquired from Bishop's College corporation was badly grown up to brush, which was cut and burned. A portion of this land was underdrained, stumps and stones removed, and ploughing commenced.

Various parts of the Pearson and E. Reed farms where tiles were laid the previous year were ploughed and worked over so as to bring them into farm rotations as soon as possible.

Much earth was removed from the hill near the road leading to the E. Reed farm, and used for levelling various places on the farm.

BUILDINGS.

The repair work done on buildings this year was the painting of the horse barn, whitewashing of cattle and out-buildings on the R. W. Reid farm, fixing of a meal room in cattle barn, and other necessary repair work.

A set of platform scales was installed at the R. W. Reid barn.

MEETINGS.

During the latter part of March a series of agricultural meetings was organized for the Dominion Live Stock Branch under the auspices of the Lennoxville Station. These were attended by the Superintendent or his assistant, in company with other speakers; besides these the Superintendent attended several farmers' gatherings in the surrounding districts.

VISITORS.

During the past year there was a marked increase of visitors at the farm. On August 12, responding to an invitation extended to all, some five hundred people visited the farm, and again on February 17 between six and seven hundred farmers were present.

EXPERIMENTAL STATION, MORDEN, MAN.

BUILDINGS AND EQUIPMENT.

The farm comprises the north half of section four, township three, range five, west of the Principal meridian, adjacent to the east side of the townsite of Morden. The Canadian Pacific railway runs through the whole length of the farm from east to west, while the Great Northern cuts off a field of about 35 acres in the southwest corner.

Work was commenced in the spring of 1915. The buildings consisted of an old frame house, a large barn, built of stone, with a superstructure of timber, various old sheds, which have served as shelter for the implements, and barbed wire fences in bad repair. The interior of the barn has been remodelled somewhat to make it suitable for housing the stock. A corral of Page wire was built close to the barn for keeping in the sheep and steers. A small office building is under construction. This will be ready for occupancy about the first of May.

The following implements were purchased in the spring of 1915: two wagons, two gang ploughs, one walking plough, two soil packers, two sets of drag harrows, two disc harrows, one corn planter, one corn scuffler, one grain seeder, one binder, one garden scuffler, one mower, one rake, one manure spreader, one Planet jr. planter, and necessary tools such as shovels, axes, hoes, rakes, forks, grindstone, etc.

Eight grade Clydesdales and one driver were also secured, with the necessary draught harness and driving outfit, consisting of a buggy, sleigh, robes, and light single harness.

FIELD WORK.

The farm is one of the oldest in this section of the province, and has been under cultivation for many years. Due undoubtedly to a poor system of crop rotation it became very weedy. The worst weeds are the twitch-grass (couch-grass) and the stink-weed (penny-cress). This condition necessitated a system of cropping which would eradicate the weeds. The weediest portion, consisting of about 100 acres at the east end of the farm and north of the C.P.R. track, was summer-fallowed and frequently cultivated throughout the growing season. A 10-acre field adjoining the summer-fallow on the west side was used as a meadow and yielded a good crop of brome hay. The remaining portion north of the C.P.R. track is occupied by the buildings, a grove of maples and cottonwood, the horticultural grounds and nursery.

On the south side of the track, at the east end of the farm, a 50-acre field of old pasture land was used as a meadow. About 40 tons of brome hay were cut on this field. Adjacent to the meadow on the west side a 50-acre field was seeded with oats. West of the oat-field and directly south, across the track from the buildings, is a triangular piece of ground of which about 11 acres were planted to fodder corn and 1½ acres to field turnips and potatoes. The yield of corn fodder was very good in spite of the early fall frosts, the turnips were average, but the potato crop was poor. The southwest corner of the farm, cut off by the Great Northern Railway track, was seeded down to western rye grass and red clover—10 acres with barley and 25 acres with oats. The total yield of grain on the farm was: 3,191 bushels of oats and 538 bushels of barley.

HORTICULTURAL WORK.

Investigational work in horticulture will, in the future, be a feature at this Station. During the season of 1915, however, little was done beyond establishing a nursery and setting out a number of rows of *caragana arborescens* and laurel-leaf willow on the grounds intended for the first orchard and vegetable garden. Seed of Manitoba maple, native ash, caragana, and mountain ash was sown in the nursery, all of which germinated with the exception of the mountain ash. Plum pits (native) and crab-apple seed were put in towards fall. The nursery was protected on all sides by a hedge of sunflowers. Clean cultivation was practised, and all weeds kept down in the orchard and nursery areas.

LIVE STOCK.

Twenty steers were purchased in November for a winter-feeding experiment. These have made very satisfactory gains and should yield a good margin of profit with the high price of beef now prevailing. The feed consisted of brome hay, fodder corn, turnips and oat-barley chop.

Two pure-bred Hampshire rams were shipped in from Stratford, Ont., in December. A flock of seventy-two yearling ewes was purchased for this Station by Mr. McKillican, of Brandon, and shipped about March 21. These are mongrels and grades of all descriptions, many showing Shropshire and Leicester characteristics. An experiment in "grading-up," will be carried on with this flock.

The horses have all thriven well and given entire satisfaction. Two of the mares, bred to a pure-bred Clydesdale stallion, are due to foal this spring.

SESSIONAL PAPER No. 16

EXPERIMENTAL FARM, BRANDON, MAN.

THE SEASON.

The season of 1915 was a most unusual one at Brandon, cold weather, with frequent severe frosts, continuing until almost the end of June. The rainfall was considerably below average. Yet despite these seeming handicaps the grain crop for Manitoba was the largest in the history of the province. The rainfall, though light, was timely, and the cool weather conserved it. The frosts appeared to delay the crops but did not kill them, and when harvest time came the out-turn was surprisingly good. Forage crops, except field roots, did not fare so well; corn was very poor and the hay crop was the lightest in many years.

Meteorological Records, 1915-16.

Month.	Highest Temperature. F.	Lowest Temperature. F.	Mean Temperature. F.	Total Rainfall.	Total Snowfall.	Hours Bright Sunshine.
1915.	°	°	°	Inches.	Inches.	
April	87·2	15	46·4	1·07	.....	164·2
May	83·2	20	47	·98	3	22 ·4
June	85	31·5	55·6	3·81	.....	164·8
July	86·5	36·5	60·5	2·34	.....	202·5
August	94·7	26	64·6	·18	.....	257·1
September	94·5	26·2	50·8	3·29	.....	106·9
October	71	17	42·4	·24	4	180·7
November	61	− 7·9	20·8	.....	11	74·6
December	33	−27·8	8·3	.....	16	72·9
1916.						
January	18·2	−51·2	−13	.....	27	99·4
February	41	−38	1·6	.....	4	143·7
March	41	−38	7·7	.....	19	137·4
Total	.....	.....	.....	11·91	84	1,829·6

TESTS OF CEREALS.

The usual tests of varieties of grain crops were conducted on uniform duplicate plots. Among varieties of wheat, Marquis shows outstanding excellence, surpassing Red Fife both in earliness and yield. The varieties of oats do not show as conclusive differences, but, on the whole, the Banner variety may safely be recommended as unsurpassed. Tests of barley show that the six-row varieties are superior to two-row; Manchurian and Garton's No. 68 are among the best of the former under test. Of the varieties of peas grown, Arthur is considered most desirable on account of its earliness. N. D. R. 52 and Primost are the varieties of flax that have done best.

FIELD HUSBANDRY.

The experiments with crop rotations on this Farm form one of the most important features of the work. Eight rotations, representing straight grain growing and mixed farming in different forms, are under test. The advantages of mixed farming are being clearly proved by this work, though during the past year this result was not so evident as usual owing to the partial failure of forage crops and the heavy yield of grains.

An extensive system of experiments on questions of the culture of the land, such as depth of ploughing, depth of seeding, methods of handling summer-fallow, methods of handling stubble, the application of barnyard manure, the use of soil packers, seeding down with grasses and clovers, ploughing sod and green manuring has been under trial here for several years. While the results obtained are somewhat indefinite as yet on many points, information of value is being obtained on others.

FORAGE CROPS.

A considerable number of hay crops, including grasses, clovers, alfalfa, millets, and grain crops cut for hay are tested yearly on this Farm. The results show, especially, the value of alfalfa, also the possibility of growing valuable hay mixtures. For annual hay production green oats have been found most successful.

Experiments with dates of seeding of alfalfa have shown the advantage of sowing early. In testing quantities of alfalfa seed per acre, it was found that lighter quantities than are generally sown gave equally as good results as the usual amounts.

A field of light, sandy land was sown with alfalfa in rows, in an effort to produce seed. This was not successful in 1915, but it is hoped that perhaps the failure was due to the season, and further trials will be made.

The usual tests of varieties of Indian corn, mangels, turnips, carrots, and sugar beets were conducted, and are reported in detail in the Forage Crops report. A test of home-grown seed corn as compared with imported seed, showed that decidedly better results come from home-grown seed, when it is well matured.

HORTICULTURE.

The crop of fruit was much below normal. A fairly large crop of apples was harvested, but only of the small crossbred sorts. The plum crop was small on account of frost injury to the blossoms. Currants, gooseberries, and raspberries were all more or less injuriously affected by weather or insects. The usual tests of varieties of these fruits and also of all kinds of vegetables were made. Cultural experiments with vegetables were also started this year, and some interesting results on the best methods of growing the different kinds were obtained.

The display of flowers was much below average on account of frosts, drought and lack of water for artificial watering. However, even under these handicaps, the perennials and some of the hardier annuals made quite a showing. Notes were obtained on the frost- and drought-resistance of the different flowers. The trees and hedges were, as they always are, a source of great pleasure and satisfaction, both to visitors and the residents. Insect pests were the worst in years, but it is hoped no permanent damage was done.

LIVE STOCK.

The cattle kept on this Farm are Shorthorns of dual-purpose type. In the herd are some very good milkers, including the holder of the highest 4-year-old record and the second highest in milk production for a mature cow in the Shorthorn Record of Performance for Canada. Records are kept of all feed used, and reports on the production and the cost thereof for each cow are presented in the Live Stock report.

The comparing of feeding steers outdoors over winter, as against stabling, was continued this year. This year's results favour, somewhat, the stabling, but not decisively. Tests of feeds for fattening steers were also made, and are reported in detail.

Further progress has been made in the grading-up experiment with sheep. The offspring of the mongrel range flock used as a foundation show the great improve-

ment that can be brought about in a short time by the use of good pure-bred rams. Data have been collected on the cost of feeding and raising sheep, and tabulated results are presented.

An experiment in pig feeding was conducted in which barley was used as a main feed, and other feeds tested as to their suitability for using in combination with barley. Tests were also made in regard to the use of potatoes and mangels, both cooked and raw as feed for young growing pigs where milk is unobtainable. Data have also been gathered in regard to the cost of keeping sows and raising young pigs. The breeding swine are of the Berkshire and Yorkshire breeds.

POULTRY AND BEES.

The breeds of poultry kept are the two popular utility breeds, Barred Rocks and White Wyandottes. Colony houses are used exclusively at the Farm, and tests are made as to the best type of construction of these houses. Individual laying records are kept, and the selection of high-laying strains is being conducted. Experimental work was carried on in conjunction with the Lacombe Station and the Central Farm at Ottawa in comparing the shipping of day-old chicks with shipping eggs for hatching. The eggs gave best results in the arrivals at Brandon from the other two points.

The apiary on this Farm is being used as a source of supply in stocking up the newer Stations. Observations of the gains in weight of a hive from day to day through the season were made.

BUILDING.

A building was erected in the poultry department for use as incubator cellar, feed room, poultry-man's workroom, office, and bed-room. It consists of one storey and basement. The basement contains the incubator room, egg room, and coal room; the ground floor serves the other purposes named. It has been in use during the past winter and has proven very suitable for the purpose intended.

EXHIBITIONS.

Two travelling exhibits representing the work of this Experimental Farm and of the Experimental Farm system generally were sent out to a number of agricultural fairs throughout Manitoba. The number that it was possible to reach was smaller than had been intended, but great conflict of dates prevented the exhibits reaching many of the best centres. The exhibits were shown at the following fairs: Neepawa, Carmen, Morden, Roland, Carberry, Hartney, Elgin, Souris, Virden, Oak Lake, Macgregor, Russell, Birtle, and Shoal Lake. A larger exhibit was also shown at Brandon summer fair. Also, a horticultural exhibit was made at the annual show of the Brandon Horticultural Society.

MEETINGS, ETC.

The Superintendent addressed a number of meetings of a provincial nature giving addresses as follows:—

"Winter Steer Feeding" and "Perennial Pasture Crops" at annual conventions of Manitoba Live Stock Associations.

"Cultural Methods in Pure Seed Production" at annual meeting of Manitoba branch, Canadian Seed Growers' Association.

"Winter Steer Feeding" at annual convention of Manitoba agricultural societies.

"Summer Feed for the Dairy Cow" at annual convention of the Manitoba Dairy Association.

He also acted as judge at the Manitoba Provincial Seed Fair.

The assistant in horticulture addressed the annual meeting of the Manitoba Horticultural and Forestry Association on "Horticultural Work at Brandon Experimental Farm."

The Superintendent and the assistant in agriculture aided the Manitoba Department of Agriculture in an "auto special" campaign of farmers' meetings in June, 1915. They addressed meetings on agricultural topics at a number of points. The Superintendent also assisted the Manitoba Department of Agriculture in conducting short course schools at Neepawa, Morden, and Virden in January and February, 1916, by giving a series of lectures on forage crops at each place. A number of other meetings were addressed, and some judging work done at local fairs, ploughing matches, seed fairs, etc., by the Superintendent and his assistants. A considerable number of articles on agricultural topics, totalling probably twenty-five or thirty, were written by the Superintendent and his assistants, for the agricultural press.

VISITORS.

It is estimated that about 9,000 persons visited the Farm during the year.

EXPERIMENTAL FARM, INDIAN HEAD, SASKATCHEWAN.

THE SEASON.

Generally speaking, the season of 1915 was favourable for the production of cereal, forage, and horticultural crops throughout southern Saskatchewan. Dry weather prevailed throughout April and May, which caused light hay crops and, to some extent, retarded the growth of early vegetables. However, with a moderate supply of moisture throughout the latter part of the season, fair average crops were harvested.

Frost was recorded every month during the season. On June 7 and 15 the thermometer registered 6° and 3° frost, respectively, which did considerable damage to grain, early-sown corn, flowers, vegetables and fruits.

Meteorological Records, 1915-16.

Month.	Temperature.					Rainfall.		Snowfall.		Bright Sunshine.
	Maximum.		Minimum.		Mean.					
1915.	Date.	°	Date.	°	°	Days.	Ins.	Days.	Ins.	
April	13	85	1	22	48·43	2	·37	.....	.....	202
May	31	87	7	13	50·10	4	1·37	.....	.....	198·5
June	24	80	7	26	53·53	10	2·32	.....	.....	169·4
July	7	84	24	33	58·32	6	1·92	.....	.....	191·4
August	10	95	1	34	64·60	4	1·75	.....	.....	267·2
September	6	80	12	25	47·23	9	3·92	2	2·50	98
October	18	70	7	18	42·13	2	·24	.....	.....	140·6
November	6	55	29	−10	21·56	.....	.....	8	18·50	60·9
December	6	39	30	−18	9·68	.....	.....	5	11	67
1916.										
January	21	18	12	−50	−14·58	.....	.....	9	19	46·4
February	15	40	10	−31	3·10	.....	.....	5	6	111·9
March	27	40	1	−33	13·45	.....	.....	10	32	106·3
						37	11·89	39	89	1,659·6

LIVE STOCK.

The horses at Indian Head are pure-bred and grade Clydesdales. During the year, experiments were carried on relative to the cost of keeping work horses, different

methods of handling idle horses, and cost of raising 2-year-old fillies. The cost of keeping work horses is always one of interest to the western farmer. The average cost of keeping fourteen work horses at the Indian Head Farm from April 1, 1915, to March 31, 1916, was $83.75 per horse.

The cattle kept on the Farm are Shorthorns. Most of the cows conform to the beef type. However, with careful breeding and selection, hopes are entertained for the development of a dual-purpose herd. All the cows are entered in the Record of Performance test, and several of them are making promising records.

In the fall of 1915, sixty head of steers were purchased and divided into five groups with the view of gaining information relative to the different methods of sheltering feeding cattle. The shelters under test are: bush *vs.* open corral *vs.* shed *vs.* stable.

A small flock of Shropshire sheep is maintained on the Farm. In addition, a flock of range ewes is kept for the purpose of keeping the summer-fallows, roadways, and shelter belts clean. These are also being used in a grading experiment to demonstrate the influence of pure-bred sires. Shropshires and Oxford rams are used for crossing purposes. The ewe lambs will be retained in the flock and the wethers used for experimental feeding.

Two breeds of swine are kept, namely, Yorkshire and Berkshire. Owing to the lack of suitable accommodation, very little experimental work has been done with pigs. However, last fall a new piggery was erected and preparations are being made for more extended work in this important branch of animal husbandry.

POULTRY AND BEES.

Work with poultry is engaging attention. During the season a site for the poultry plant was located and laid out. A permanent house 16 feet by 32 feet, large enough to accommodate 100 laying hens was erected. The flock was increased by purchasing 100 bred-to-lay White Wyandottes and Barred Rock pullets from breeders in eastern Canada. These were kept in cotton front houses of different types. Records were kept of the maximum and minimum temperatures.

Work with bees was commenced. A small bee building was erected in which to keep stores, etc. The apiary increased from two to eight colonies, including two received on June 15 from Brandon. During the season, 163 pounds of honey was produced, put up in 5-pound pails and sold for 22 cents per pound.

FIELD AND CULTURAL WORK.

A large portion of the Farm is utilized for rotation and cultural work. Four rotations, considered more or less applicable to Southern Saskatchewan conditions, are in operation. About five hundred plots are being utilized to investigate such problems as different methods of summer-fallowing, preparing stubble land for crops, depth of ploughing, seed-bed preparation, manuring, methods of packing, etc.

CEREALS.

The usual work with cereal crops was conducted on uniform test plots. Marquis wheat, as in former years, showed its superiority over other varieties. In oats, some of the earlier varieties such as Daubeney and Eighty-day gave highest yields. However, Banner is more suitable for a wide range of conditions. The varieties of barley proving most suitable are Manchurian, O.A.C. No. 21, and Gold. Premost flax was the highest yielder. Arthur and Solo peas gave best satisfaction.

FORAGE CROPS.

On account of the dry weather throughout April and May, hay crops were very poor. Western rye grass seems best adapted for hay, and brome grass for permanent

pastures. In alfalfa, the Grimm variety gives best results. Early-sown corn suffered from late spring frost. However, a fair average crop was harvested and put into the silo. In field tests, Northwestern Dent gave best results. Turnips, mangels, sugar beets, and field carrots gave very satisfactory yields.

HORTICULTURE.

The season of 1915 was only an average one from a horticultural standpoint. The early part of the season was so dry that seeds and plants got a very poor start. A moderate rainfall during July brought vegetables on fairly well, and an average yield was obtained.

In addition to the variety tests which are carried on from year to year, a series of cultural experiments with garden vegetables and potatoes was commenced this season with the object of ascertaining the best methods of planting, cultivating, harvesting, and cost of production. These experiments will extend over a period of five years in order to arrive at the average results over a number of seasons.

The potato crop was exceptionally good considering the season, and excellent yields of high-grade potatoes were obtained. The potato beetle made its appearance, which necessitated spraying the crop once with Paris green. A few of the outstanding varieties this season were Gold Coin, Carman No. 1, Morgan Seedling, Table Talk, Wee MacGregor, and Manitoba Wonder. The work with vegetables would indicate that, with proper cultivation and care, good success may be attained even with a limited rainfall of 7·73 inches, which was the total received during the growing season.

Annual and perennial flowers got a poor start early in the season, but later on came ahead and made a most satisfactory showing. Some of the outstanding annuals were asters, sweet peas, petunias, verbenas, pinks, stocks, mignonette, poppies and pansies. In perennials might be mentioned paeonies, iris, perennial phlox, Oriental poppy, bleeding heart, columbine, lychnis, and day lily.

No fruit was obtained this year, as frost occurred every month during the season. Apple and plum trees made a good growth during the summer, and went into winter with the new wood well matured. Small fruits also made a satisfactory growth.

Trees and ornamental shrubs made a good growth, but owing to frost the flowering varieties gave very little bloom. Caraganas, Tartarian honeysuckles, and a few late varieties of lilac were the only ones that flowered. Insect pests were numerous during the summer on the avenues and shelter-belts, but were checked by the use of poison sprays.

BUILDINGS AND IMPROVEMENTS.

During the year several buildings were erected, including a new piggery, four hog colony houses, a permanent poultry and brooder house and small apiary house. Some of the older buildings were repaired and painted.

The west and north sides of the Farm were re-fenced and also some internal fencing done; in all about three miles of woven wire fence was erected at an average cost of 86 cents per rod.

VISITORS.

A large number of farmers from outlying districts visited the Farm throughout the season.

EXHIBITIONS.

Exhibits from the Experimental Farm were staged at Regina, Swift Current, Wolseley, and Whitewood.

SESSIONAL PAPER No. 16

EXPERIMENTAL STATION, ROSTHERN, SASKATCHEWAN.

THE SEASON.

The season of 1915 was the driest of any since the taking of records at this Station began, and following, as it did, a particularly dry season, the crops were anything but satisfactory.

Coupled with the drought was the frost in June which cut off nearly all vegetables and roots, all of the corn and much of the grains. The frost weakened the grain, and as the weeds were in many cases smaller than the crop they were protected from injury and subsequently made rapid growth. Late sown grain and late planted potatoes did much better than early seeding.

METEOROLOGICAL RECORDS 1915-16.

Month.	Temperature F.					Precipitation.				Sunshine.
	Highest.	Date.	Lowest	Date.	Mean.	Rainfall.	Snowfall.	Total.	Date.	
1915.	°		°		°	Inches.	Inches.	Ins.		Hours.
April	71·3	26th..	13·7	2nd..	44·6	0·30	.....	0·30	9th..	24·21
May	78·8	29th..	23·4	5th..	51·2	1·15	.....	1·15	15th..	297·8
June	81·0	3rd..	24·2	16th..	54·7	1·00	.....	1·00	20th..	219·9
July	84·2	9th..	35·8	1st...	58·5	3·12	.....	3·12	16th..	246·0
August	93·6	10th..	31·2	25th..	64·2	0·28	.....	0·28	17th..	319·4
September	79·1	6th..	11·8	13th..	46·2	1·07	.....	1·07	24th..	107·8
October	67·5	18th..	19·4	20th..	40·6	0·32	.....	0·32	5th..	171·7
November	47·1	5th..	−16·6	29th..	18·7	.....	9·5	0·95	10th..	119·9
December	28·0	6th..	−20·5	30th..	6·8	.....	8·2	0·82	22nd..	83·2
1916.										
January	15·7	16th..	−59·3	12th..	17·9	.....	10·0	1·00	8th..	70·9
February	42·2	16th..	−34·8	10th..	2·45	.....	·8	·08	11th..	163·3
March	40·8	11th..	−32·8	1st...	11·7	.....	·7	·07	27th..	149·4
Total from April 1st, 1915 to March 31st, 1916						7·24	29·2	10·16	.....	2,192·4

EXPERIMENTAL WORK.

The experimental work of previous years was continued except in the case of some of the cultural experiments which were discontinued because of the unsuitable condition of the soil. The prevalence of alkali completely nullified any differences in the work on prairie breaking, soil packers, commercial fertilizers, and seed-bed preparation. In the case of the variety tests there were some sorts discarded that had proved unsatisfactory, and a few new ones were added.

EXHIBITIONS.

A large exhibit was prepared and displayed at the exhibitions at Saskatoon, Prince Albert, Radisson, and Kinistino. Very favourable comments were made respecting this, and particularly regarding the taking of such a display to the smaller places. Further efforts will be made during the coming season to display at more of the country fairs.

FENCING.

The extension to the farm purchased in 1914 was fenced in the summer of 1915. In all, 3¼ miles of fence was built. The posts were cedar, 8 feet long, 6 inches at the

top, 3½ feet into the ground, and 20 feet apart, and the wire was nine strands, 9 gauge, 48 inches high, and a strand of barbed wire was placed 6 inches above the top of the woven wire.

The posts for half a mile of the fence were treated with creosote for 4½ feet from the lower end. The creosoting was discontinued because of its excessive cost, 35 cents per post.

LIVE STOCK.

Cattle.—One cow was purchased in the spring, making three now being kept for the supply of the families living at the Station. These are of the dual Shorthorn type. Besides these there are two pure-bred Holstein heifers, due to freshen during the coming summer.

Horses.—The eight horses purchased in the spring worked steadily all summer and retained good heart, although they became rather thin in flesh towards the end of the season. They were imported from Ontario. The horses that had been at the Station for a number of years remained in good condition throughout the season.

Cattle.—Eighteen steers were purchased in the autumn for winter feeding. These were fed prairie hay, and oat and barley chop, and continued to make satisfactory gains all winter.

Sheep.—A beginning in sheep was made by the purchase of one hundred breeding ewes and three rams in November. The ewes are range bred and of various ages. The rams are Leicesters, and two purchased from A. J. Mackay of MacDonald, Man., are particularly good individuals of their breed.

FIELD WORK.

Besides the regular work on the original land belonging to the Experimental Station, which includes the investigation work in cultural methods, rotations and tests of varieties, a considerable amount of preparatory work was done on the three quarter-sections recently added to the farm. One hundred and twenty acres of one quarter-section was summer-fallowed by being ploughed twice. The remainder, being scrub prairie, was cleared and nearly all broken. Of another quarter-section, 80 acres that had been summer-fallowed was sown to oats, 31 acres of stubble was sown to oats, and 19 acres of stubble sown to barley. The other quarter was sown to oats and barley which was cut for hay, as the land had been cropped for a number of years without adequate cultivation.

HORTICULTURE.

The Orchard.—The seedling apple trees planted in 1912 and 1913 are making satisfactory growth, and a number of individual plants in the nursery rows give promise of developing into good trees. The trees planted in 1910 and 1911 bore a large number of blossoms, but the June frost spoiled the possibility of fruit.

Bush Fruits.—The currants and raspberries yielded well, but the strawberry crop was a partial failure, many of the blossoms and fruit buds having been injured by the June frost. The season was the first one in which any gooseberries fruited on the farm.

Vegetables.—The drought affected very seriously many of the vegetables, and especially the celery and the cauliflower, and the root crops were not up to the standard. All the tomatoes were killed on June 12 by frost, and so were the squash, pumpkins, melons, and cucumbers. Nevertheless, interesting results were obtained in some of the cultural work.

Potatoes.—Twenty varieties of potatoes were tested out for yield, and in many cases the results were quite different as compared with similar tests carried out under

different seasonal conditions in previous years. Besides the work in varieties, the cultural work carried on for the past four years was continued and some new experiments were added.

Flowers.—The flower border begun in 1911 continues to improve every year. The perennials are becoming better established, and experience from year to year teaches which of the annuals are most suitable.

EXPERIMENTAL STATION, SCOTT, SASK.

SEASONAL NOTES.

The season of 1915 has been particularly favourable to the production of good crops of grain and hay, but has not been so satisfactory for fodder corn, field roots, and vegetables.

Spring opened up comparatively early, with seeding general by April 13, and with the soil in ideal condition.

Average April weather was experienced, but the months of May, June and July were cooler than usual. Frosts as late as June 16 damaged corn, potatoes, and tender vegetables. Grain crops were also frozen back, but, owing to the abundant supply of moisture in the soil, together with the copious June rains, made rapid recovery. The crops made a phenomenal growth during these three months. Commencing with August 3, warm, dry weather set in. The precipitation from July 15 to the end of the season amounted to only 2·5 inches. This was the sum total from seventeen showers.

Satisfactory weather conditions permitted rapid progress in harvesting and threshing, with the result that the largest and most profitable crop ever grown in northwestern Saskatchewan was saved in first-class condition.

Unusually severe frosts were experienced during the second week in September, thus shortening the growing period for potatoes, field roots, hardy vegetables, etc. The short season, together with the dry weather of the latter part of the summer, decreased the yields of this class of farm produce.

CEREALS.

The duplicate system of testing was used for the first time. This method affords an opportunity to check up any experimental errors that may occur.

In the varieties of wheat tested, Marquis gave an increased yield of 5 bushels per acre over Red Fife, and matured in six days less time. A part of the difference in yield of these two varieties was due to the Red Fife lodging. In the plot tests with oats, Victory again headed the list. In the field tests, a special strain of Ligowo oats, secured from the Indian Head Farm, was used, with the result that this variety outyielded both the Victory and Banner. The Ligowo has been recommended by the Dominion Cerealist, for northwestern Saskatchewan. It is a short, plump oat, and weighed 3½ pounds more per measured bushel than any other variety under test.

Barley has not given as good yields in this district as might be expected. This is due, in part, to the land being new, and, in part, to the practice of using barley as a cleaning crop. Of the varieties under test, Black Japan (a short-strawed six-row, black variety) gave the heaviest yields. O. A. C. No. 21 has a higher four-year average. Duckbill has proved to be one of the best of the two-row kinds.

Arthur peas are again at the top of the list in point of yield.

FIELD HUSBANDRY.

Crop Rotations.—The experiments with crop rotations have required considerable attention. Five systems are under test. These include growing wheat continuously, growing two crops of wheat and then summer-fallowing, and three mixed-farming

rotations. In connection with these rotations, an investigation into the cost of production is also carried on. The average cost per bushel to produce wheat during the past season amounted to 24·7 cents. The cost of growing wheat after peas amounted to 23 cents per bushel. Barley following peas cost 20 cents, and oats following wheat cost 12 cents per bushel.

Rates and Dates of Seeding.—The duplicate system of tests was used in determining the proper amounts of seed wheat, oats, barley and flax to use; also in the experiments with sowing at week intervals to ascertain the most opportune time to sow. A total of 100 plots was necessary for this work.

Soil Management.—Some valuable data have been secured from the soil management experiments, particularly from experiments in prairie breaking, seeding down to grass and clover, and applying barnyard manure. In all, 473 one-fortieth acre plots are required for experimenting and to permit the preparatory treatment necessary before certain experiments can be carried out.

HORTICULTURE.

The tests with varieties of vegetables, flowers, fruits, trees and shrubs have received careful attention.

To the usual tests with vegetables has been added a fairly comprehensive set of cultural experiments, including tests with peas, beets, carrots, parsnips, potatoes, etc. The results from the cultural investigations with potatoes were particularly uniform in the gradation of yields secured from the various tests.

In the orchard several young hybrid apple trees bore their first crop. Excellent crops of black and red currants, strawberries, and gooseberries were harvested. The yields from the raspberries were light, due to a dry spell at the time the fruit was setting.

The flower garden included a most complete collection of both annual and perennial flowers. Daffodils, Canterbury bells, and hollyhocks, that are usually considered lacking in hardiness, made a splendid growth. The pæonies bloomed for the first time.

A number of trees and shrubs were added to the arboretum and to the ornamental plantings on the lawn. Trees of all kinds made a splendid growth, although some damage was caused by the severe September frosts.

FORAGE CROPS.

Western rye grass has given the best yields in previous years, but owing to the bountiful supply of moisture, timothy outyielded the Western rye grass in hay production. In the annual hay crops, spring rye gave the heaviest returns, but was much inferior in feeding value to the oats, or oats and peas. The millets did not prove satisfactory.

Of the thirteen varieties of fodder corn under test, Gehu gave the best yields, reaching the early silk stage by September 4, the date on which the corn was harvested. Early Longfellow was second in point of yield, but was inferior in the quality of forage, being quite soft and immature when cut.

Twenty-six varieties of turnips, five of carrots, and three of sugar beets were tested. Twelve varieties of mangels were grown, but were badly damaged by the severe early September frosts.

LIVE-STOCK.

Experimental work with live-stock consisted of a continuation of the investigation into the cost of wintering idle work horses, and into the cost of horse raising.

A flock of 100 range ewes was purchased in the autumn, with a view to grading up by using pure-bred Shropshire sires. The cost of maintaining the flock is also being ascertained.

Twenty head of cattalo, and other hybrid buffalo, have been wintered on the Station; they were kept in a large pasture, with no shelter excepting a straw pile and the protection afforded by a coulée. In addition to the pasturage, they were fed at the rate of one oat sheaf for each animal, and for the last three weeks in March, 5 pounds of hay per head per day was fed in addition to the oat sheaves. The animals came through the winter in good condition.

FENCING AND ROADMAKING.

One-half mile of woven wire fencing was erected. In order to determine the value of creosote as a preservative, the lower 3½ feet of all the posts, except the check posts, was painted three times with creosote. Approximately every fifteenth post was left untouched in order that the increased period of usefulness of the treated posts might be ascertained.

Sixty rods of road were graded with the split-log drag. After grading, the road was gravelled.

A dam, 10 feet high, was constructed in a water-runway in the pasture field. This dam is intended for the purpose of conserving a supply of the water from the spring freshets.

VISITORS.

A total of 2,524 persons was recorded as having visited the Station during the year 1915-16.

EXHIBITIONS AND EXCURSIONS.

An exhibit from the Scott Experimental Station was staged at the following summer fairs: Macklin, Unity, Wilkie, Cut Knife, Luseland, North Battleford, and Lloydminster.

A picnic, organized by the local Farmers' Club, was held on the Station on July 15. Approximately 500 people spent the day at the farm.

MEETINGS ATTENDED.

The acting Superintendent assisted in selecting and measuring off a number of Illustration Stations, and addressed meetings held in connection with these at four points in central western Saskatchewan. He also acted as judge of farm produce at Macklin, Unity, and Wilkie summer fairs, and addressed a number of farmers' meetings held in the vicinity of the Station.

METEOROLOGICAL RECORD, 1915-16.

Month.	Temperature F.			Precipitation.			Total Sunshine.
	Highest.	Lowest.	Mean.	Rainfall.	Snowfall.	Total.	
1915.	°	°	°	Inches.	Inches.	Inches.	Hours.
April	76·8	20·2	48·6	0·90	.....	0·90	286·8
May	76·0	26·6	51·1	1·40	.....	1·40	264·0
June	75·0	29·5	53·3	3·54	.....	3·54	208·4
July	80·6	32·8	58·7	2·11	.....	2·11	258·9
August	91·8	31·0	64·6	0·48	.....	0·48	309·7
September	79·0	9·0	46·9	0·98	.....	0·98	145·7
October	68·5	14·2	41·1	0·25	.....	0·25	168·1
November	51·2	−12·8	19·1	.....	4·0	0·40	113·7
December	38·2	−10·6	12·5	.....	1·0	0·10	72·0
1916.							
January	16·0	−55·4	−18·1	.....	12·5	1·25	65·2
February	49·0	−32·8	04·9	.....	5·0	0·50	153·3
March	43·2	−28·4	11·4	.....	10·5	1·05	149·7
Total for the year	.....	.....	.....	9·66	33·0	12·96	2,195·5

EXPERIMENTAL STATION, LETHBRIDGE, ALTA.

THE SEASON.

The season of 1915 will long be remembered as one of the most favourable for all kinds of field crops that has ever been experienced in southern Alberta. The yields of all kinds of forage crops were good and in horticulture the results obtained in apple growing made the season somewhat notable. It was, however, in cereals that the most striking results were obtained. The average yield in the southern part of the province was very high for all grain crops while in some individual cases the yields obtained were so large as to be scarcely credited, in fact a field with a really poor crop was practically unknown. There was not an excessive amount of precipitation during the season of 1915, but there was more than a normal precipitation during the last few months of 1914, and as most of this moisture was carried over in the soil to the spring of 1915, the crops were started with a good reserve of moisture in the subsoil and the rains during May, June, and July came just when needed. There was no period during the whole growing season when grain suffered in any way at all for moisture and phenomenally high yields were the natural result. The first work on the land was done on March 31. The last frost in the spring was May 16, when 31° was registered, and although there were cool nights on June 14, 15, and 28 there were no summer frosts, in fact the crops had no appreciable set back of any kind. The first frost in the fall was on September 11 and on the 12th a killing frost occurred, but by this date all kinds of grain crops were well matured.

METEOROLOGICAL Records, 1915-16.

Month.	Temperature F.			Precipitation.	Sunshine.
	Maximum.	Minimum.	Mean.		
1915	°	°	°	Inches.	Hours.
April	81·9	21·0	49·23	0·04	230·3
May	78·4	28·5	49·99	3·03	230·2
June	79·0	36·0	53·6	4·84	225·9
July	86·5	36·5	58·63	3·44	291·4
August	92·7	45·2	66·53	0·96	333·8
September	80·5	20·0	49·35	1·32	161·4
October	79·0	20·0	47·3	0·96	180·2
November	61·0	− 3·5	29·33	0·75	140·8
December	55·2	−11·5	24·8	0·27	96·1
1916					
January	31·8	−41·5	− 8·93	1·09	98·7
February	65·8	−27·5	18·45	0·86	120·2
March	65·8	−16·0	31·65	0·90	148·3
Total	.....	.....	.....	18·46	2,257·3

No Irrigation.—The conditions were so favourable on account of the ample supply of moisture that was in the soil and subsoil and the generous rains that came during the time the crops were growing that irrigation was unnecessary for grain crops, root crops, general garden crops and in a general way hay crops, although the grasses and a good portion of the alfalfa on the irrigated part of the farm were irrigated once. This is the first time in eight seasons that crops have been grown on the Station that the yield of grain has not been improved, at least to some extent, by the application of water.

LIVE-STOCK.

No breeding stock is kept on the Station at the present time but, during the winter, feeding experiments have been carried on with lambs and steers. These are along similar lines to those that have been carried out for the past few seasons. The primary object of these tests has been to demonstrate the feasibility of disposing of the surplus alfalfa hay grown on the irrigated land in the district by feeding rather than by baling and shipping it. The test with lambs was not concluded by March 31, as one of the objects of this winter's test was to compare a short feeding period with a long feeding period. There were two cars of range lambs purchased in the fall. One was put on heavy grain feed and was disposed of on March 7. The other car was sheared on March 31, and will be fed for at least a month longer. The average weight of the fleeces obtained was 5·61 pounds, the staple of which was good. The profits obtained from the first group were $1.76 per head, and the profits from the second group will probably be even better on account of the prospect of a high price for the wool.

Four carloads of steers were purchased in the fall, and fed in four lots. Three lots were sold on March 17, but the profits were not as great as with the lambs, on account of the small margin between the buying and selling price. Lot four is being kept on long feed. They have been fed only a moderate quantity of grain and it is expected to run them on pasture and dispose of them some time in June

ROTATION OF CROPS.

As the work with the various rotations proceeds, most valuable and interesting information is being obtained and this is without doubt one of the most important lines of work being carried out on the Station. There are six rotations laid out on the dry part of the farm and three on the irrigated. One of the most striking points brought out on the dry land rotations during the past season has been the beneficial results obtained from the application of barnyard manure. Some exceptionally high yields have been obtained where the crop has been affected by the manure. On the irrigated land the high net profit per acre, due to the generous yield of alfalfa hay, is worthy of note.

CULTURAL EXPERIMENTS.

Some of the leading facts that have been demonstrated rather clearly by these experiments might be mentioned. In handling prairie sod the most profitable way is to break in May or June and allow to stand over the winter, or to break very shallow and backset in the late summer or fall about 2 inches deeper than the land was broken. In depth of ploughing average results indicate that summer-fallow should be ploughed about 8 inches deep. In regard to the time for ploughing stubble, our results show that spring ploughing gives higher yields of grain than fall ploughing.

In the packing experiments the subsurface packer shows a slight but consistent advantage over the surface or combination packers. There is an advantage in packing the summer-fallow in the spring at seeding time, but no appreciable advantage has been found in packing the soil at the time the land is being ploughed for summer-fallow. The packing of spring ploughed stubble land is advisable. In the preparation of the seed bed it has been shown that thorough preparation pays well for the extra work. In regard to depth of seeding, grain sown 2 inches to 3 inches deep gave better results than that sown shallower or deeper. In the manuring experiments it was found that when stable manure was applied previous to ploughing for summer-fallow very satisfactory results were obtained. Ploughing under crops for green manuring has not been found to give very satisfactory results as so much of the moisture in the land is used up to produce growth, that the land is too dry to be ploughed satisfactorily as it turns over lumpy and is left too open and loose.

CEREALS.

The results obtained with all cereals were very satisfactory, as higher yields were obtained in all cases than has been the case since the Station was established. On the irrigated part of the farm a plot of Marquis wheat yielded at the remarkable rate of 94 bushels to the acre. Red Fife yielded very much lower, but this was no doubt due to the fact of its lodging much worse than did the Marquis. In oats, Gold Rain headed the list with a yield of 159 bushels and 24 pounds to the acre. With barleys, Odessa and Mansfield headed the list with a yield in each case of nearly 97 bushels to the acre. The highest yield of peas obtained was with the Prince which produced at the rate of 76 bushels per acre. A plot of flax yielded at the rate of 31 bushels per acre and winter rye 64 bushels and 46 pounds per acre.

FORAGE CROPS.

The yields from all forage crops were satisfactory. In the case of corn, although the amount of growth made was good, still the cool weather that prevailed on account of the increased precipitation delayed the maturing of the crop with the result that the ordinary sorts grown for fodder were not as well developed as usual and the earlier sorts, some ears of which usually ripen, failed to do so. In the variety tests of turnips, mangels, carrots, and sugar beets the yields obtained on both the dry and irrigated portions of the farm were heavier than normal.

The yields of hay on the non-irrigated part of the Station were good. The alfalfa on the irrigated land, although giving very good returns, did not average quite as high as has been the case in seasons that have been dry and hot when the crop has received sufficient irrigation. The greatest set-back met with during the season was the difficulty in curing the hay on account of the showery weather which prevailed for so much of the time. Of the 30,000 or more tons of alfalfa hay produced on the irrigated lands of Southern Alberta during the season of 1915 less than 20 per cent would grade No. 2 on account of being put up in such poor condition. The alfalfa seed crop was a practical failure. This was due no doubt to so much wet weather during the time when the plants were in flower.

HORTICULTURE.

The season proved very interesting from the horticultural standpoint. The most striking results were obtained perhaps in the fruiting of apples. Eighteen varieties of standard apples fruited, also ten varieties of cross-breds and a number of the varieties of ordinary crabs. Over 120 boxes of crab apples (including cross-breds) were sold. This is the third year that the apples have fruited on the Station and is, of course, much the heaviest crop obtained so far. It will be rather interesting to follow the results in this work to ascertain whether the season of 1915 was abnormally favourable or whether satisfactory results with apples can be expected generally after the trees have reached a bearing age. Excellent yields of small fruit were obtained. The results in the garden were generally satisfactory, except that the season proved too cool for some of the more tender sorts, such as tomatoes, etc. The flowers, including the perennials, annuals, and the flowering shrubs, made the grounds very attractive.

POULTRY AND BEES.

The investigation and demonstration work along these lines progressed satisfactorily. The summer of 1915 was favourable for the rearing of chicks. During the winter fairly satisfactory results were obtained in egg production and on March 31 there were 230 chicks hatched with the six incubators full of eggs, so that the prospects for a good supply of early chicks for the season of 1916 are good.

The results from the apiary during the summer of 1915 were very encouraging and suggest that the possibilities in bee-keeping in the alfalfa districts in southern Alberta are very much greater than has yet been realized. From the two colonies, 274 pounds of extracted honey was produced, together with an increase of three swarms.

BUILDINGS.

No new buildings were put up but some alterations were made in the barn, improving very much the facilities for storing grain.

EXCURSIONS AND VISITORS.

Two excursions or picnics to the Station were arranged for. On July 15, a special train was run from Medicine Hat and on the 17th one from Calgary over the Aldersyde line. Both were well patronized, although it was raining on the second day. The visitors on both occasions expressed their appreciation of these excursions and all seemed to hope some arrangements would be made for such visits in future seasons. During the year there have been a large number of people visit the Station; 1,852 have been counted, although there were doubtless many more than this.

MEETINGS AND CONVENTIONS ATTENDED.

During the year the Superintendent has attended and addressed a number of institute meetings in various places in the southern part of the province. On November 22 he attended the convention of the Western Canada Irrigation Association at Bassano where he delivered an address and acted as judge at the soil products exhibit in connection therewith.

EXPERIMENTAL STATION, LACOMBE, ALTA.

THE SEASON.

In 1915 work on the land commenced on April 3, and the weather during the spring was such as to permit the continuance of seeding operations without interruption until completed on May 4.

Growth during the months of April, May and early June advanced crops beyond their usual stage of maturity until the crops on June 15 were thirty days earlier than usual. From the middle of June till toward the end of July the weather was unusually cool and wet, crops lost the advantage gained earlier in the season and became much later than normal at the end of July. The rains ceased abruptly and the weather grew warmer and continued hot for several weeks causing the crops again to rush forward and ripen rapidly. This combination of weather conditions produced the largest average yields in the history of the province, straw being abundant, with the heads especially long and well filled with grain of excellent quality. The first frost came on September 13, but by this date grain crops were practically harvested and frost did no injury in this direction, though potatoes were in some instances frozen in the ground and tomatoes and other similar garden crops were damaged to a considerable extent.

METEOROLOGICAL RECORDS, 1915-16.

Month.	Max.	Date.	Min.	Date.	Precip.	Sunshine.
1915.	°		°		Inches.	Hours.
April	80·8	29th	13·9	9th	0·32	214·8
May	76·0	9th	29·9	22nd	1·245	130·1
June	75·8	24th	31·9	13th	8·485	179·6
July	79·8	21st	34·9	3rd	3·37	209·7
August	88·6	29th	40·9	24th	0·84	287·6
September	74·3	1st	16·0	13th	1·833	170·2
October	74·2	16th	9·9	5th	0·533	144·7
November	53·8	4th	− 8·4	13th	0·3	121·0
December	48·8	20th	−12·1	30th	.....	83·4
1916.						
January	28·1	19th	−52·1	27th	0·4	89·0
February	62·7	19th	−29·1	5th	1·38	131·9
March	59·7	10th	−28·1	1st	0·52	129·0
Total	.....	.....	.....	.....	19·226	1,891·0

LIVE-STOCK.

The horses now number 24, cattle 98, hogs 60, and sheep 38.

Three grade and one pure-bred Clydesdale foal were raised in 1915. Cost figures covering the raising of horses are being secured for each six months' period, with each successive crop of colts. During certain previous years a number of the Station horses have been wintered in the open without other food than access to the straw stack and the range of land which had not been heavily pastured the preceding season. Horses so wintered have come through in good condition and in the majority of instances have gained flesh, but when brought in for spring they have been comparatively soft. In order to determine what the difference in cost of wintering would be, and also to decide whether the improvement in condition in spring would warrant the extra cost, horses were wintered in the open during the past year under a more liberal system of feeding. These horses were fed what hay they could eat, having free access to hay in the feed rack at all times, and were fed 4·4 pounds of grain daily. The cost per head per day has been increased under this system from 3·3 cents to 11·07 cents, but the condition of the horses when brought in for spring work was better than under the first method to which reference has been made in this paragraph. The horses will require to be put to the test of work before an opinion can be expressed as to whether the improved condition of the horses in spring will warrant the increased expenditure for wintering them.

Figures as to the possible gains of 2- and 3-year-old steers on grass have been secured during the past summer. The average gain of 102 head of steers during the summer was 358 pounds, which gain if marketed at 6 cents per pound would represent an earning power of over $2,000 for a section of wild land. These cattle were used in the feeding trial during the winter, comparing the values of various rough fodders available to the men feeding cattle in this province. The following fodders were compared: Green sheaves, prairie hay, prairie hay and oat straw, green sheaves and prairie hay, timothy and alsike hay.

Prairie hay, being available at $5 per ton, produced the greatest profit of any of the rations used, while green sheaves and prairie hay showed the second largest profit.

The comparison of various rough fodders for dairy cattle made during the past winter supplies corroborative evidence to the figures secured a year ago. The cost of producing a pound of butter when the bulky fodder consists of peas and oats silage is greatly reduced, the reduction being 19·88 per cent over the cost when the same feed

is fed but which has been carried in the usual way and fed as green sheaves. It is believed that the silo will be used by dairymen as a means for cheapening and increasing the production of their herds. The forage crop (peas and oats) used to fill the silo has not been known to fail and will produce a yield of from 8 to 12 tons of green weight per acre.

Information as to the stock-carrying capacity of various crops, when used for hog pasture, has been obtained during the year. It is interesting to note that the poorest pasture used is far superior to the dry feed lot, and that an average reduction of $1.75 per hundred has been effected by the use of pasture in producing one hundred pounds of pork. The herd of breeding sows has been greatly increased, and it is hoped that in the coming season it will be possible to repeat and elaborate upon this work.

HORTICULTURE.

Crab apples have been produced at this Station during the past year, which is the third successive crop of this class of fruit here. The apple seedlings made a good growth during the year and have now attained sufficient size to permit of being thinned in the row so that it will be possible to fruit these trees in the nursery row; and since their hardiness has already been determined, the quality of the fruit may also shortly be judged without much additional labour.

A number of cultural experiments with different garden vegetables have been carried on. The most striking result is perhaps the yield of onion sets which was produced, the crop being worth in the neighbourhood of $3,000 per acre, when valued at 6 cents per pound.

The growth of trees and shrubs has been satisfactory, and the appearance of the grounds has correspondingly improved.

ROTATIONS.

One of the striking facts in connection with the work with different rotations is the average profit per acre secured. It is evident that a rational six-year rotation can be planned which will return interest at 7 per cent on an investment of $100 per acre, and strengthen the foundation of the investment by adding fertility to the soil.

CULTURAL EXPERIMENTS.

The work in connection with the cultural experiments has been continued and in certain directions has provided information of value. The advantage of fall ploughing, of comparatively deep ploughing, of early summer-fallow and of the application of farmyard manure is established and additional figures have been secured indicating in terms of increased yields the extent of this advantage.

POULTRY.

This Station has 93 hens, 4 cocks, 18 ducks, 7 turkeys, 185 pullets, 25 cockerels, 6 geese, and 287 chicks.

Experiments have been carried on during the year to determine the cost of producing a pound of gain on birds in the fattening crates when fitting for market in the fall. During the month of December, 196 dozen eggs were produced and marketed bringing a return of $101 for the month, certain pens of pullets laying 45·3 per cent of eggs daily. The eggs from these same pens are now being used for hatching and have produced 61.4 per cent of living chicks, which appear to be strong and healthy.

BUILDINGS AND IMPROVEMENTS.

A new piggery 32 by 68 feet has been erected, in which there are ten pens and a feed room on the ground floor, with accommodation overhead for storing bedding

and feed. The structure is complete, and since no care has been spared in the construction of this building, a comparison will be made during the coming year as to the cost of producing pork in this building *versus* in the straw-covered cabins outside, which will be most interesting.

Five new corrals have been erected in which the outside feeding experiments with steers were carried on during the past winter. Twenty new cabins to be used in the pasture feeding experiments for hogs have been constructed, together with two self feeders for this work. Two fields in the main farm have been enclosed with woven wire fencing and a number of feed lots for hogs have also been fenced.

FAIRS.

This Station was represented by an exhibit at the following fairs and exhibitions during the season, the exhibit being viewed by approximately 23,910 visitors: Crossfield, Swalwell, Edmonton, Red Deer, Wetaskiwin, Tofield, Kitscoty, Calgary, Daysland, Stony Plain, Lacombe, Trochu, Lloydminster, and Vermilion.

MEETINGS ATTENDED.

The Superintendent addressed a meeting of the Provincial Dairymen's Association at Calgary, the Alberta branch of the Holstein Breeders' Association at Olds, the Irrigation Congress at Bassano, the Innisfail Agricultural Society, the School of Agriculture, Vermilion, and the Teachers' Convention, Stettler. He acted as judge of dairy cattle at the Calgary Industrial Exhibition and of sheep and swine at the Interprovincial Winter Fair at Saskatoon.

VISITORS.

An increasing number visit this Station each season, the total during the past year being approximately 1,254, without including casual visitors.

EXPERIMENTAL STATION, SUMMERLAND, B.C.

The spring of 1915 was exceptionally wet. There was very little snow in the mountains, and it was feared that the dams would not fill, but the heavy rains saved the situation, and the dams were all full before high water was over.

Seeding was delayed until the last week in April so as to be sure of water for irrigation. Good rains fell up to the middle of June and all the clover, timothy, and alfalfa made good growth.

Potatoes were harvested in October and were a fair crop.

Frost stopped work for a few days in November, and in this same month a very heavy gale was experienced, which blew over some of the flumes.

The weather was very cold during January and the beginning of February, ranging from a few degrees above to a few degrees below zero.

LIVE-STOCK.

There are seven horses at the Station. Since the beginning of the year records of the cost of maintaining these have been kept.

BUILDINGS.

During the year some temporary buildings were erected, consisting of implement sheds, stable for one team, an office, and a store-room for grain and seeds, with a small workshop at one end.

CLEARING.

Eleven acres on the lake-front were cleared of all stumps, ploughed, and that part below high-water mark filled in. This land was well disced, and seeded to oats, but the resulting crop was patchy. All the stones were taken off the ploughed land on the benches, and as soon as it was fit, the land at the lake level was ploughed again in the fall, and a great number of roots were cut and removed. Clearing was also commenced on the land on the upper benches during this season.

Clearing of Wooded Land.—An area of 13 acres was cleared of timber, burned, blasted, stumped, and made ready for seed.

Cost of Clearing Operations.

Labour—	
Cost of falling trees, trimming up same and sawing into log lengths, of clearing all roughage, and of picking and shifting stones and roots	$ 860 90
Cost of shifting and piling logs	115 10
Cost of blasting stumps	97 00
Cost of pulling stumps	273 15
Cost of any ploughing and harrowing done	66 25
Material—	
Powder, fuse, and caps	108 00
Miscellaneous repairs to stumping machine and cables	18 70
	$ 1,539 10

HORTICULTURE.

On the horticultural land were planted 100 apple trees, and all have done fairly well, although they had no irrigation. There are indications of a very heavy apple crop in the district, and peach and apricot buds were not so much damaged as at first appeared. The hotbeds are full of plants which are now nearly ready for setting out.

FORAGE PLANTS.

A start was made in work with forage plants, and there are now eighteen varieties of grasses in duplicate plots for tests in hay and seed production.

FENCING.

About 500 rods of woven wire fencing were put up, and 140 rods of plain wire on the south boundary over the gulch. All the corner posts are pitch pine and the other posts are fir, size 5 inches by 5 inches, treated with creosote.

IRRIGATION.

A steel siphon was installed from the Summerland municipal flume, on the north side of Trout creek, to the Station, and a flume system was started to cover the land broken the previous fall. Two weir boxes were erected with automatic weir registers, one on the north main, and one on the south main flume.

A domestic pipe was installed from the Summerland municipal pipe-line to the building site for the Superintendent's house and barns.

The main irrigation system was finished during the summer and fall, and some measuring boxes were installed at various points.

IRRIGATION PIPE-LINE.

The area of irrigable land on this Station is 280 acres, including gulch, all of which can be served from this pipe-line. At present 180 acres are under a flume system, and the rest can be reached by a fluming and a short pipe system to avoid high flumes crossing dips in the land. The 10-inch steel spiral pipe has proved a great success.

Cost of Installing.

Labour—		
Cost of squaring timber for and building bridge spanning Trout creek	$	203 50
Cost of handling pipe from car at C. P. R. Company's wharf to its final position over Trout creek, of digging any necessary trench and filling in same, of making and setting up penstock, of erecting any trestlework to support pipe, of wiring down any pipe above ground, and of coating any scarred pipe with a tar preparation to prevent rust		498 10
Cost of handling lumber and covering exposed pipe		55 00
Material: for bridge spanning creek—		
2 rods, 11 inches by 12 feet 8 inches, and washers		7 80
Lumber		5 00
Material: for penstock—		
Iron rods and bolts		26 25
Lumber		19 83
Miscellaneous—		
Nails, used in making bridge, penstock, and trestle		9 00
Tar, used on pipe		2 62
Lumber, used for trestle-work supporting pipe		58 05
Lumber, used for covering exposed pipe		44 00
Galvanized iron elbow (steel elbow missed from order)		6 97
Cement, used to imbed galvanized iron elbow		6 00
Pipe—		
10-inch pipe supplied by General Supply Company of Canada		2,961 27
Freight on pipe (to Summerland)		370 77
Dockage (at Summerland)		1 50
	$	4,275 66

Flume Lines—Cost of Installing.

Labour—		
Cost of surveying flume lines; of hauling and laying stones for flume sills, of unloading cars and hauling and distributing lumber, of building flumes, weirs, measuring boxes, and culverts, and of creosoting wooden culverts	$	3,356 25
Material: Lumber		2,626 69
Nails, including 4-inch, 3-inch, 2½-inch, 5-inch, 6-inch, and shingle nails used for tacking galvanized iron strips on flume boxes		305 15
Wire, for wiring flumes to bedded rocks		98 00
Galvanized iron used on distributing and measuring boxes		48 62
Miscellaneous, creosote, oakum, cement, flume-gates, etc.		184 42
	$	6,619 13

NOTE.—Cost of surveying irrigation and domestic pipe lines, $153.75.

ROADS.

During the fall and winter, roads were built on the new clearing to meet the main road to Penticton and Summerland. Here the grade was cut down to allow easier hauling, and partly gravelled.

EXHIBITIONS ATTENDED.

Three fairs were attended by the Superintendent, and great interest was shown in the exhibits from this Station. Most of the fairs in the Penticton valley were postponed because of the war, and the fairs at Armstrong and Kelowna were held on the same day.

EXPERIMENTAL STATION, INVERMERE, B.C.

THE SEASON.

The season 1915-16 was from every point of view the most favourable since this Station has been in operation. The snow disappeared early, and cultivation of the land commenced on March 19. Seeding operations were undertaken under favourable conditions early in April, and opportune rains on the 29th and 30th of the month supplied much needed moisture. The spring frosts, which are often experienced in the district, were this year absent with the exception of one which occurred on the night

of May 30, and which did considerable damage to young plant growth. The precipitation during the month of June (3·92 inches) was in excess of any previously recorded rainfall in the district, and was of immense value. In July the rainfall (3·79 inches) was almost as great as in June, and while it was a great benefit in most respects, it interfered considerably with the hay harvest. The weather conditions during the month of August were most favourable for the ripening of grain, and notwithstanding the heavy precipitation of the two preceding months, considerable irrigation was required for roots, clover and vegetable crops. Fodder corn made rapid growth during the month. The first fall frosts were experienced on the nights of the 12th and 13th of September. October was, except for the boisterous winds experienced at times, exceptionally favourable for the prosecution of the autumn work. In November all cultural operations were stopped by a frost recorded on the 6th, when the temperature fell to 19° F. The weather during the month of January was exceptionally severe. On thirteen days the maximum temperature was not above zero. From the 11th to the 19th, inclusive, the highest temperature was −2° and the lowest −34°. February was a month of thawing and freezing; every indication seemed to point to an early break-up of the winter, and on several occasions rapid thaws set in, which were checked by a recurrence of low temperatures. The spring conditions which enable work to be commenced on the land are ten days to a fortnight later for the approaching season than were those experienced in the spring of 1915.

METEOROLOGICAL RECORDS, 1915-16.

Month.	Temperature.				Precipitation.	Sunshine.
	Date.	Highest.	Date.	Lowest.		
1915.		°		°	Inches.	Hours.
April	16th	75	21st	24	1·14	208·7
May	7th	78	29th	30	1·01	168·0
June	23rd	82	8th	35	3·92	197·7
July	20th	83	5th	40	3·79	211·4
August	6th	89	21st	41	0·67	296·9
September	5th	80	20th	27	0·72	151·8
October	22nd	65	7th	23	0·90	124·7
November	1st	49	28th	13	0·90	59·0
December	4th	40	30th	−16	0·58	43·4
1916.						
January	23rd	40	12th	−34	0·45	99·9
February	15th	48	1st	−25	1·22	97·8
March	11th	58	5th	1	0·45	131·7
Totals					15·75	1,790·1

FIELD HUSBANDRY.

The rotation experiments were continued as in previous years. In the dry-farming rotation, alfalfa having failed, in spite of the exceptionally favourable conditions of the season, to produce a commercial crop, it has been decided to eliminate this crop in future from the dry-farming rotation at this Station. The grain crops of Marquis wheat and Banner oats on the irrigated rotation plots produced good yields and fine samples of grain. Judging from this year's results in growing Manchurian barley and Pioneer wheat on the dry-farming rotation plots, one would be tempted to think that such a system might be carried on in this district successfully, but the exceptional

precipitation during the months of June and July has to be taken into account, and this year's result must not be considered as conclusive evidence. The root crops were badly attacked by aphis, and this was especially prevalent in the turnip crop. The whole district suffered severely in this respect.

CEREALS.

Test plots were laid out in the fall of 1914 on land which had in that year produced wheat; two of six-row barley, two of two-row barley, three of oats, and five of peas.

The yields this year were light, due, no doubt, to the lack of available plant food in the soil.

The following rotation has been inaugurated in order to supply the necessary plant foods for future work.

1. Peas (to be ploughed under).
2. Cereal variety test plots.
3. Clover (first crop taken off, second ploughed under).
4. Peas variety test plots.
5. Cereal variety test plots.

The Marquis wheat plot in the above was also used for taking the records for the "Influence of Environment" experiments which were inaugurated this year in collaboration with the Meteorological Office.

FORAGE CROPS.

Variety tests in mangels, sugar beets, and turnips were continued, the treatment of the plots being the same as last year except that a dressing of nitrate of soda was discontinued. The yields were in all cases below the average.

Many varieties of Indian corn were again tested. The results were a decided improvement over former tests, the crops being heavier, though all varieties were again frosted before reaching maturity.

Three varieties of millet were planted, hog millet giving the heaviest crop.

HORTICULTURE.

The variety tests were continued for the third season and cultural experiments were undertaken for the first time, in testing a variety of methods in vegetable growing.

Lawns surrounding the Superintendent's and foreman's houses were sown and made a very satisfactory start.

A number of hedges were planted, amongst them being several experimental hedges of native coniferous plants.

POULTRY.

A new location on the north slope of the Toby gorge has proved most satisfactory during the summer months, but the lack of sunshine during the winter is a decided detriment to the productivity of the birds when eggs are at their greatest price.

The administration building came into use in the spring of 1915.

A brooder house to accommodate the Candee brooder was also added to the equipment of the poultry yards, and these buildings have been of the greatest use and convenience.

A number of turkeys were bred last season, and experiments were made to ascertain the cost of feeding for the Christmas market. The experiments gave interesting results. A number of birds were sent to Ottawa and Lacombe Experimental Farms for stock purposes, and a couple of breeding pens have been reserved for next season's work.

BEES.

The heavy precipitation in June and July rendered the season an unfavourable one for the bees. The new position on the poultry grounds in the Toby gorge is a good one, being well sheltered from the winds. An out-apiary started on the ranch of Mr. J. Johnson, about 1,000 feet higher than the Station apiary, has furnished interesting comparisons.

An average of 30 pounds of honey per hive was obtained last season.

The bee building erected during the past season provides a convenient centre for the work of this department.

NEW BUILDINGS.

In addition to the erection of the poultry administration building, and the bee building mentioned above, the implement shed has been moved to a more convenient location and enlarged.

FAIRS.

An exhibit was prepared and sent out from this Station to a number of agricultural fairs held in this part of the province. The points visited were Cranbrook, Nelson, Grand Forks, Burton City, and Nakusp, in addition to the fair held for the Windermere district on the Experimental Station grounds. At all points the utmost interest was shown and appreciation expressed for the opportunities which the exhibit gave farmers of benefitting by the work being done on the Experimental Farms. As a result of attending the above fairs, over two hundred persons made application to be placed upon the mailing lists of the department, and a markedly increased number of letters of inquiry on a variety of agricultural subjects has been received.

During the year the Superintendent, in addition to visiting a number of the local farms where his advice was asked on a variety of subjects connected with the work of the farm and ranch, and attending the fall fairs at Cranbrook, Nelson, and Grand Forks, made a visit recently to Victoria where he attended meetings of the Farmers' Institute, the British Columbia Fruit Growers' Association, the British Columbia Entomological Society and the British Columbia Live Stock Association.

EXPERIMENTAL FARM, AGASSIZ, B.C.

THE SEASON.

The season of 1915 was generally a good one for crop production. It was a banner year for small grain and silage corn but somewhat too dry for the best production of root crops. The spring was early and ideal for seeding. May was warm and produced just enough gentle precipitation to keep the crops growing rapidly. These conditions prevailed until the middle of June, but the latter part of this month was fine and hot. July was extremely hot and dry, only a few trifling showers falling. These conditions ripened the grain early and well; corn made excellent growth but root crops began to suffer. August was one of the hottest and driest months experienced for seventeen years and was followed by an exceptionally dry September. Such conditions as these tended to make excellent corn crops but were too dry for the best development of roots. Precipitation in the autumn months was below average. The winter was one of the longest and coldest on record and the spring exceptionally backward and wet, the precipitation for March trebling the twenty-four years' average.

METEOROLOGICAL RECORDS, 1915-16.

Month.	Temperature.				Mean Temp.	Precipitation.			Sunshine.
	Date.	Max.	Date.	Min.		Rain.	Snow.	Total.	
1915.		°		°	°	Inches.	Inches.	Inches.	Hours.
April	16	76	23, 29	31	50·21	5·37	...	5·37	139·6
May	4	81	1	35	54·27	5·2	.....	5·2	131·1
June	30	91	3	42	59·44	2·36	.....	2·36	138·1
July	20	95	11, 15	40	62·9	1·62	....	1·62	195·0
August	21	98	5	45	66·22	0·07	.....	0·07	172·0
September	24	81	8	40	56·73	1·26	.....	1·26	109·6
October	3, 7	68	8, 11	33	48·07	11·26	.....	11·26	59·36
November	5	53	13, 30	28	38·56	7·75	.....	7·75	34·1
December	4	52	30	18	38·01	13·79	16·0	15·39	23·0
1916.									
January	17	42	24	− 2	21·44	0·89	20·0	2·89	72·1
February	26	62	1	15	35·87	2·03	29·0	4·93	100·2
March	18	56	5	27	41·15	13·78	.....	13·78	58·36
Total	.....	... ...	.....	.....	.....	....	.....	71·88	1,232·52

LIVE-STOCK.

Horses.—The force of horses on the Farm is kept only for working purposes and no breeding nor experimental work was done. Careful records have been kept of the food consumed and the number of hours of labour performed. This is being done in an endeavour to secure reliable figures on the food cost of horse labour on a farm in this section of the province. There has been no addition to the force during the year. On account of the severity of the winter, and the lack of land clearing, the horses did not perform so much labour as usual but were consequently fed more lightly.

Dairy Cattle.—In the Holstein-Friesian herd, breeding and experimental work has been continued more successfully than in the past. Much more thorough culling has been possible during the past year because of the herd's rapid natural increase. The health of the cattle has been good, and two tests for tuberculosis add the third year to the herd's freedom from this disease. Some very creditable official and semi-official records have been made during the year and at a reasonable cost.

The experimental work consisted of the following trials for milk and butter production:—

Corn silage *versus* clover silage.
Mixed hay *versus* oat and barley straw.
Mangels *versus* carrots.
Automatic watering devices *versus* watering from the mangers.

Some special work was also done in calf rearing and the housing of yearling and two year old heifers in open sheds *versus* dairy stable. Details of this work may be found in the report dealing with the special work on this Farm.

Swine.—In the breeding herd of Yorkshire hogs there are twenty-three head which is not an increase in numbers over the previous year. This herd has been kept during the year in the bush on absolutely unproductive land and the performance of the sows has been superior to that of any previous year.

All surplus stock of this herd has been used for experimental work during the year.

The experimental work with rice meal feeding has been continued and 145 hogs have been used in this work. A trial was made with self feeders for fattening hogs, and thirty-two hogs were used in this experiment, making a total of 177 raised, fed and butchered on the Farm for experimental purposes.

Much interest has been evinced by feeders and manufacturers in the rice-meal work on account of the large available supply in this province. This accounts for the large amount of experimental work done with this by-product. Fuller discussion regarding this subject will be found under the report for swine for this year.

Sheep.—The flock of Horned Dorset sheep has been improved and considerably increased in numbers and some common grade ewes have been added to the flock.

On account of the severe winter, the cost of keeping sheep increased to some extent. The lambing results of both the pure-breds and the grade flock were quite satisfactory. A breeding experiment is being carried on and some trials are being made regarding the development and fitting of fall lambs for butchering. The demand for breeding stock of this particular breed is increasing somewhat in the province. In the breeding and handling of the sheep special attention has been paid to wool production.

Poultry.—The poultry plant has been enlarged to the full capacity of a one-man experimental plant, and over 500 mature birds were carried over the year.

A new administration building, combining office, feed room, work room, and incubator cellar was built during the year; also a small brooder house was erected.

The stock consists of Barred Plymouth Rocks, Single Comb White Leghorns, White Pekin ducks, and a small flock of Homer squab pigeons. Some feeding as well as incubator and brooding experiments were made during the year and special attention was paid to the marketing of poultry products in various ways. The general returns from the poultry operations were very satisfactory.

FIELD HUSBANDRY.

The four-year rotation started in 1911 on the Farm has been continued with results further showing that the rotation is well adapted to this country. On account of financial reasons, no land clearing has been done and only a small amount of fence has been erected. Of the 140 permanent plots set aside for field cultural work, 35 plots were devoted to each of the following: hoed crops, grain, hay first year, hay second year. The work has been divided under the following heads to suit a four-year rotation on a dairy farm.

1st. Methods and seasons of cultivation.

2nd. Seasons for applying barnyard manure.

3rd. Methods of applying commercial fertilizer.

4th. After harvest cultivation of hoed crop land.

5th. Preparation of land for corn.

The past season's work was very successful but one year's results are not definite enough to base conclusive statements upon.

FORAGE CROPS.

The growing of forage crops and testing of different varieties is one of the most important phases of the field work at this Farm. The double-plot system has been in use during the past two years, and careful comparative studies have been made of seventeen varieties of silage corn, fourteen varieties of mangels, seventeen varieties of turnips, six varieties of carrots and four varieties of sugar beets. Twenty permanent plots have been started to procure information relative to the most suitable hay crops in three- and four-year rotations. Further tests have been made with the harvesting of clover for silage and the results have been quite satisfactory. The growing of mangel

seed has received some attention and reliable figures as to the cost of production on a small scale have been procured. A yield of one ton of seed per acre has been obtained, which gave excellent cash returns. The seed was of good appearance and of high germinating quality.

A series of plots was sown to a large number of the various kinds of grasses and clovers for demonstration purposes, and some very useful information has been obtained as to the adaptability of different varieties for this particular climate.

CEREALS.

Variety tests were carried on during the year with oats, peas, barley, and wheat. On account of the favourable season, very good results were obtained from these plots with the exception of wheat, which was again infested with the "wheat midge." Four varieties and ten mixtures of cereals were also used for the production of hay.

HORTICULTURE.

The work was considerably handicapped this year because Mr. J. D. Brydon, who had charge for the past year, enlisted for overseas service. However, quite an extensive series of variety tests of vegetables and flowers was carried on and much labour was expended in keeping the lawns and grounds in good condition. Some new lawns, which were put down early in the season, greatly improve the appearance of the place. The young orchard was well cared for during the year and some of the early varieties should come into bearing in 1916. In spite of the careful spraying some few cases of canker have developed on the apple trees. Other than this the trees are healthy and have made excellent growth. A number of cultural tests were made for the production of early and main crop potatoes, results of which will be found in the special report on horticulture for this Farm.

BEES.

The season was not at all favourable to this line of work and although a good flow of honey was obtained in the early spring from the maple bloom, there was not any clover or mid-season flow. Owing to a change in manipulation which did not prove suitable to the local conditions prevailing at this Farm, the number of colonies was decreased. The long, cold winter was also responsible for further decrease which amounted in all to 37·5 per cent of the spring count of the colonies.

FERTILIZER EXPERIMENTS.

Sixty-five permanent plots have been set aside for field work with commercial fertilizers. Mangels were grown as the hoed crop this year with the fertilizers, and results varied greatly with the kind and quantity of the fertilizer applied.

EXHIBITIONS.

An agricultural exhibit, prepared at Ottawa and added to by the Agassiz Farm, was exhibited at Vancouver, Agassiz, Mission, North Vancouver, and Chilliwack. Great interest was displayed by the general public, and each Exhibition Board expressed its appreciation.

EXPERIMENTAL STATION, SIDNEY, B.C.

CHARACTER OF THE SEASON.

The season was a very favourable one for hay and grains. The spring opened very early and gave opportunity for early seeding. The precipitation during the early part of the growing season was sufficient for the needs of the plants, and the

16—1916—6a. Face p. 96.

Flumes, Irrigation System, Summerland, B. C.

View of Garden and Orchard. Experimental Station, Invermere, B.C., August, 1915.

temperatures very favourable to the development, the ripening or curing and the harvesting of grasses, clovers and cereals. July and August were very dry months with high temperatures, giving a condition of soil dryness that checked the development of the root and corn crops.

METEOROLOGICAL RECORDS, 1915-16.

Month.	Temperature F.			Rainfall.	Snowfall.	Total.	Heaviest in 24 hrs.	Sunshine.
	Mean.	Highest.	Lowest.					
1915.	°	°	° ,	Inches.	Inches.	inches.	Inches.	h. m.
April	51·0	70·0	35·0	1·65	.....	1·65	0·69	223 4
May	55·0	75·5	40·0	2·06	.....	2·06	0·36	181 2
June	59·95	86·0	46·0	0·74	.....	0·74	0·26	304 0
July	63·39	92·0	45·0	1·30	.....	1·30	0·83	297 2
August	65·0	90·5	48·0	0·03	.....	0 03	0·03	274 6
September	54·59	72·0	42·0	0·76	.....	0·76	0·30	191 1
October	50·30	62·0	39·0	4·17	.....	4·17	0·68	104 1
November	40·80	53·0	30·0	4·82	.....	4·82	0·59	70 9
December	39·05	51·0	26·0	6·89	.....	6·89	1·21	58 6
1916								
January	27·5	48·0	13·5	2·51	30·15	5·52	0·98	65 4
February	37·0	58·0	15·0	2·90	25·90	5·49	0·78	103 3
March	41·0	56·0	26·0	4·63	2 25	4·85	1·35	80 6

Total amount of precipitation..... 38 28 inches.

GENERAL DEVELOPMENT.

The roads have been improved by gravel and grading. The park drives have been changed in location to suit the general contour of the land. Tree debris has been removed in part from the park and useful trees have been planted. Many Japanese, French, and native shrubs and trees were planted in newly-established borders to suit the new layout of park drives.

The drainage operations commenced in 1914 have been carried out during the year to the extent of putting down 2,475 feet of 3-inch tile, 1,584 feet of 6-inch tile and 759 feet of 8-inch tile.

The clearing of stones from the land caused the greatest expenditure of labour on this Station for the year. On one hundred and sixty-two days a portion of the force was engaged in this work.

The new buildings erected were a poultry administration building and a portable brooder house.

The beginning of a wharf was undertaken by the construction of a crib 60 feet by 20 feet by 5 feet at the shore-line and filling same with field stone. This work will be carried on until we have wharf accommodation for motor boats carrying visitors from the islands of the gulf.

FIELD HUSBANDRY.

The field husbandry work at this Station during the past year has been largely the growing of feeds for the farm stock. Conditions on the land have now reached a point where one can go ahead with definite rotation work. Forty-four acres that had been cleared of its virgin forest growth during the previous two years was prepared for the growing of oats. Thirty-six acres of the area produced a crop of 33⅓ bushels per acre. Eight acres were cut and made up as oat hay, yielding 2,700 pounds per acre.

ANIMAL HUSBANDRY.

The work in animal husbandry comprised the care of the farm horses, the two cows and a few swine. The horses came through the year in good condition, all having increased somewhat in weight. Eleven barrows were secured during the year with a view of preventing any possible waste of vegetable matter. These pigs were reared successfully and with good profit.

CEREAL HUSBANDRY.

The cereal work at this Station was limited to the following numbers of varieties of grains: autumn wheats, four; spring wheats, three; autumn barley, two; spring barley, four; autumn oats, one; spring oats, three; flax, one; autumn rye, four; peas, two; vetches, one. All cereal plots made normal development.

TOBACCO HUSBANDRY.

A small area was devoted to tobacco culture. The plants grew well but difficulty was experienced in curing. The plants were harvested late for the reason that they did not ripen during the dry season and continued to grow on into the wet period of September.

APIARY.

The bees have been a fair success considering the foundation stock. The season proved a good one for flower development and consequent nectar secretion. The experience of the year indicates that the bees of this district need a strong infusion of Italian bee stock.

HORTICULTURE.

Many variety, and a number of cultural, tests were made with vegetables, fruits, and flowers. Considerable bulb experimental work was carried on, and a good beginning made in vegetable and flower seed production. An experimental nut orchard was established. A fig plantation and a plantation containing many varieties of foreign economic plants were also set out. Considerable planting with both foreign and native material was done in the established arboretum.

PUBLICITY.

The following exhibitions were attended and an extensive exhibit set up at each: Saanich Woman's Institute Flower Show, Cameron Nanoose and Newcastle Agricultural Society fair at Hilliers, The Islands Agricultural Society Fair at Ganges, Salt Spring Island, and the North and South Saanich Agricultural Society fair at Saanichton. A permanent exhibit has been set up in the Victoria and Islands Development Association headquarters in Victoria for the benefit of Victoria people and visitors.

FERTILIZERS.

The necessary preparatory data were secured on the area set out for fertilizer experimental work.

FAIRS ATTENDED AS JUDGE.

The Superintendent attended the South Saanich Flower Show, as judge of flower exhibits, and the North and South Saanich Agricultural Society Fair as judge of vegetables, roots, cereals, and dairy products.

ADDRESSES GIVEN.

The following Institutes, Growers' Associations and Boards of Trade, held meetings to be addressed by the Superintendent of this Station: North and South Saanich Farmers' Institute, Sidney Board of Trade, The Growers' Association of Duncans, The Victoria and Islands Development Association, The West Saanich Woman's Institute, The Sidney Young People's Society. All addresses were on some phase of agriculture.

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DOMINION EXPERIMENTAL FARMS

REPORT

OF

THE DIVISION OF CHEMISTRY

For the Year ending March 31, 1916

PREPARED BY
Dominion Chemist - - - - - - - - Frank T. Shutt, M.A., D.Sc., F.I.C., F.R.S.C.

REPORT OF THE DIVISION OF CHEMISTRY

Ottawa, March 31, 1916.

J. H. Grisdale, Esq., B.Agr.,
Director, Dominion Experimental Farms,
Ottawa, Ont.

Sir,—I have the honour to submit, herewith, the twenty-ninth annual report of the Division of Chemistry of the Dominion Experimental Farms.

The untoward circumstances affecting the work of this Division referred to in our last report, have, we regret to say, continued during the past year. Since the date of last writing, the technical staff has been still further reduced by two enlistments for overseas service, and much difficulty has been experienced in obtaining temporary assistance efficiently to carry on their work. We have in consequence been obliged to relinquish, for the time being, certain of our investigations and lines of research.

We have further to report in this connection, that increased demands from farmers for chemical assistance and the undertaking of special investigations made necessary by war conditions, have very materially added to the labours of the Division. Thus it is that, in spite of every effort to cope with the situation, it has been impossible to prevent the rather large accumulation of work, both chemical and clerical, which to-day awaits our attention.

The following table contains a classification of the samples received during the year for examination and report. The total, 4,393, includes 304 samples of flour examined for the British War Office and 1,180 samples from packing houses, sent in by the Meat Inspection Division of the Health of Animals Branch. The remainder comprise samples in connection with investigations carried on by the Division and those sent in by farmers. During the previous year (1914-15) the samples received numbered 3,829.

Samples received for Examination and Report during the twelve months ending March 31, 1916.

Sample.	British Columbia.	Alberta.	Saskatchewan.	Manitoba.	Ontario.	Quebec.	New Brunswick.	Nova Scotia.	P. E. Island.	Total.
Soils	46	481	457	442	123	84	15	4	0	1,652
Muds, mucks and marls	6	0	0	1	15	17	8	10	9	65
Manures and fertilizers	22	2	1	0	22	42	45	86	6	226
Forage plants and fodders	26	22	19	7	237	65	5	8	17	406
Waters, including rain and snow	10	18	30	12	127	38	23	4	8	270
Samples from Meat Inspection Division										1,180
Miscellaneous, including samples from War Office supplies, dairy products, fungicides, insecticides, etc	9	12	30	3	479	43	8	6	4	594
										4,393

Reference has been made to the analyses of samples submitted by the Meat Inspection Division. This work, which was first undertaken in 1908, has yearly increased in volume. In 1914-15 the samples numbered 662; the past year, as already stated, 1,180. A classification of the samples is given as follows:—

Nature of Sample.	Number Received.
Lards, tallows, oils and butters	40
Preserved meats, sausage, mince meat, etc	84
Colouring and dye stuffs	105
Preservatives	107
Pickling solutions	46
Spices and condiments	26
Evaporated apples and waste	637
Canned corn	110
Miscellaneous	25
	1,180

Experiments with Fertilizers.—This work has been extended and reports on systematic experiments recently inaugurated on the branch Farms and Stations at Charlottetown, P.E.I., Cap Rouge, Que., and Agassiz, B.C., are now given, in addition to results from the Experiment Stations at Kentville, N.S., and Fredericton, N.B., from which results have been reported for three years past. Provision has been made to further extend this branch of the Division's activities. Among the outstanding results of last season's work is one of very considerable importance, that the largest profits from fertilizers were obtained from plots upon which they had been used in conjunction with manure. This seems to be particularly marked on light, sandy soils.

Agricultural Meteorology.—As indicated in our last report, the investigation to ascertain the influence of environment on the composition of wheat, commenced in 1905, has been enlarged. The work is now being carried forward through the co-operation of the Meteorological Service in a much more comprehensive and detailed way than was previously possible.

Seaweed Investigation.—The preparations of a nitro-potassic fertilizer at Clarke's Harbour, N.S., by the drying and grinding of certain Atlantic coast seaweeds, briefly referred to in our last report, was proceeded with during the spring and summer of 1915 under the personal supervision of Mr. B. Leslie Emslie, a recent addition to the Chemical staff. At the close of this preliminary investigation, 50 tons of this fertilizer had been prepared, which will receive practical trial in the field during the present season, 1916. Arrangements have been made to test its efficiency on the branch Experimental Farms and Stations in Eastern Canada, and on the farms of about one hundred farmers scattered throughout the Maritime Provinces and Quebec.

Sugar Beets.—Many inquiries are now being received as to the possibilities of Canada as a sugar-producing country, and our investigation as to the quality of the sugar beets as grown at many widely distant points throughout the Dominion, is to-day of peculiar interest. The present report gives our results as obtained from beets grown on seventeen Experimental Farms and Stations in 1915 and the data, speaking generally, are of a most satisfactory character.

The Feeding Value of Farm Roots.—We have again submitted to analysis samples of the more important varieties of mangels, turnips, and carrots as grown on the Central Experimental Farm. The results should prove of value to all interested in the growing and feeding of roots.

Fodders and Feeding Stuffs.—This chapter includes a number of milling by-products and manufactured feeds, as used by the Animal Husbandry Division in feeding tests, or respecting which information was sought by farmers. The farmer and dairy man of the present day must study the composition of the feeds he purchases as well as

their prices, if he would buy and feed to the best advantage. We are of the opinion that this matter of the relative cost of protein and fat in different feeding stuffs is one that does not receive sufficient attention on the part of buyers.

Limestones and Marls.—Many analyses of limestones are here reported. These samples for the most part have been sent in for examination and report by Provincial Departments of Agriculture. The results are, on the whole, most satisfactory, indicating that limestones of high grade and quite suitable either for the preparation of ground limestone or for burning to quicklime, occur in many parts of Canada.

It is with much satisfaction that we note the increasing interest in the question of liming. We particularly desire the farmer to understand that lime or ground limestone cannot be depended on to maintain fertility, but used judiciously on soils in need of lime, they undoubtedly will increase the soil's productiveness.

Insecticides and Fungicides.—Several of the more widely advertized brands of lime-sulphur wash and of arsenate of lead are reported on in the interest of the orchardist and fruit grower. It would seem from our results that there is a general desire on the part of all the larger manufacturers to put on the market an honest material, safe and of standard strength.

The strychnine content of a number of "gophercides" sold in Northwestern Canada has been ascertained, and instructions added for those who desire to prepare the poisoned bait at home—which is much the cheaper practice.

Soils from the C.P.R. Tract in Alberta.—For a number of years past we have been engaged, at the request of the Irrigation Branch, Department of Interior, in an examination of typical soils from the several irrigation tracts in Alberta. The chief object of this investigation has been to ascertain the suitability of the areas in question for farming under irrigation, and this has called more especially for a determination of the "alkali," where such is present. Our findings in this matter have been largely used in the classification of the land into irrigable and non-irrigable areas. There have been analysed, to date, between one and two hundred groups of soil—each group usually consisting of five members.

For the greater part of the time two assistants have been engaged by the Department of the Interior to carry on the analytical part of this investigation, and it seems very probable that the work may continue for another two or three years.

Soils Examination for farmers.—A constantly increasing number of cultivated soils, accompanied by requests that they be submitted to a complete chemical analysis, are received by this Division.

This results from the fact that many farmers are under the impression that the data supplied by such an analysis will serve to indicate accurately the fertilizer treatment required by the particular soil.

Even were our staff and other equipment adequate to cope with analytical work of such magnitude, we should still seek to discourage requests for its performance, since the value of the results thus obtained is in nowise commensurate with that of the time expended thereon. The case is altogether different with virgin soils representative of more or less large untilled uniform areas; here a complete analysis of properly collected samples may yield results of wide and fundamental value.

A chemical analysis, which involves the determination, not alone of the total amounts of plant food present in the soil, but also the proportion of these which may be considered immediately available, is an exceedingly lengthy process. Furthermore, it should be remembered that a chemical analysis is in itself insufficient as a guide to soil treatment and management, since other important factors have to be considered. Hence the necessity in the majority of cases of appealing directly to the soil by means of fertilizing experiments for final and conclusive evidence as to the quantities and forms of plant food that will give a profitable response.

On the other hand, it is true that valuable information may be gained from a simple mechanical analysis performed in presence of available data respecting the location, the history of the soil as respects its past manuring and cropping, the nature of the subsoil, drainage, etc., of the soil under examination, and of the general meteorological conditions of the district. At the same time, the possible lime requirements of the soil and a knowledge as to its nitrogen content may also be desirable.

The great majority of soils received by us are submitted to such an examination, which we have proved from long experience will provide a sufficiently reliable basis for general recommendations as to treatment with manures, fertilizers, suitable crops, etc. Farmers desiring such an examination are requested to apply to the Division for the necessary instructions to be followed in the collection and shipment of the sample, and for a copy of the form to be filled out giving the information respecting the soil and environment and which is necessary for a correct diagnosis.

Fertilizing Value of Rain and Snow.—The data for the ninth year of this investigation differ markedly from those of preceding years. It would seem probable that atmospheric conditions due to local causes, e.g., factories, have resulted in the greatly increased nitrogen content of the precipitation that has been recorded for the past year.

Well waters from farm homesteads.—The interest in this important, we might say vital, matter continues. The present report gives, in outline, our results on samples sent in during the year, and offers advice regarding the location of the well, its care, etc., that may help the farmer in obtaining a pure and wholesome supply for his household and stock. We commend the reading of this chapter to all farmers.

The Staff.—Mr. C. H. Robinson, B.A., as senior assistant chemist and the only remaining member of the staff previous to the war, continues in charge of the important work and investigations connected with the samples submitted by the Meat Inspection Division. He has also participated in the general work and oversight of the laboratories in addition to much excellent work with our several lines of investigation.

Mr. A. T. Stuart, B.A., whose leave of absence expired early in the year, resigned his position to follow up special work in the utilization of electrical energy for manufacturing purposes. During his term of office Mr. Stuart had done good work in the several investigations carried on by the Division, and I was very sorry to lose such a faithful and excellent assistant.

Mr. L. Aitchison Browne, B.Sc. (Edin.), who was appointed on January 15, 1915, is absent on leave of absence granted in September, 1915, for active military service overseas.

Mr. J. T. Janson, B.Sc. (Lond.), who was appointed to the staff in 1913, was granted leave to rejoin his regiment in England for active service overseas in August, 1914, immediately following the outbreak of the war. He still continues in active service at the front.

Mr. Douglas S. Cole, B.A. (McGill), was appointed to the staff in October, 1915, and was granted leave of absence in February of the present year for active service overseas.

Dr. J. T. Mackey was appointed to the staff in April, 1915, and resigned in August of the same year to accept a more lucrative post on the staff of the Technical School in Toronto.

Mr. C. W. Graham, B.A., appointed as temporary assistant in March, 1915, resigned to accept a position in the Dunlop Rubber works, Toronto, in September of that year.

Mr. R. L. Dorrance, B.A. (Toronto), received an appointment on the staff in February, 1916, and has already proved himself a careful, painstaking analyst of considerable ability.

Mr. L. E. Wright, B.Sc. (Queen's), was appointed temporary assistant in October, 1915. He is an earnest and good worker and bids fair to be a valuable member of the staff.

The increasing work in connecting with our fertilizer experiments carried on at the branch experimental farms and stations, made it most desirable that we should have on the chemical staff an assistant who could undertake the immediate supervision and control of this investigational work and who could assist with the large correspondence dealing with fertilizers and soil management generally.

For this work we were fortunate in obtaining the services of Mr. B. Leslie Emslie, C.D.A., F.C.S., who so successfully carried on under our direction the special investigation in the preparation of a nitro-potassic fertilizer from seaweed at Clarke's Harbour, N.S., during the early months of 1915. He was appointed to the permanent staff in September, 1915. His long and wide experience in carrying on field experiment with fertilizers, and his intimate knowledge of fertilizing materials and their uses, combine to make him a valuable member of the staff in effectively dealing with the manifold problems connected with the application of fertilizers and the up-keep of soil fertility.

I have the honour to be, sir,
Your obedient servant,

FRANK T. SHUTT,
Dominion Chemist.

SUGAR BEETS FOR FACTORY PURPOSES.

The further development of the beet sugar industry in Canada is a matter of considerable interest to agriculture and commerce at all times, but particularly so in these days when the price of sugar has greatly increased owing to war conditions. To what extent is it possible for the Dominion to produce profitably the sugar she requires for the consumption of her people? A complete and entirely satisfactory answer to this inquiry cannot at the present time be given, but in so far as the quality of the raw material—the sugar beet—affects the problem, a favourable answer can unhesitatingly be given. Our investigation, carried on now a number of years, has conclusively shown that beets of excellent quality for sugar extraction can be grown in many widely distant portions of the Dominion. Unfortunately the quality of the beet is only one of several factors that must receive consideration before a correct conclusion can be arrived at as to the financial success of the enterprise. Labour for the proper culture and harvesting of the crop, its availability and cost, has been and still is one of the determining factors and one of the most potent up to the present time against the development of the industry in this country. In this particular, however, we think the hope may be entertained that conditions will improve. With the greater attention to intensive methods of farming and the desire to increase soil fertility that is now evident, and the large immigration that may be expected at the close of the war, it would seem possible, if not probable, that sugar beet culture may, as far as the farmer is concerned, be more profitable than in the past. In the meantime we are obtaining through this investigation, carried on at points from Prince Edward Island in the East to Vancouver island in the West, most valuable data as to the richness, purity, and yield of certain leading factory varieties of sugar beets. This information will assuredly be of great service in indicating the districts in which climatic and soil conditions permit of the growth of suitable beets, provided seed of the best quality is used.

As in past years, the seed used in this investigation in 1915 was procured from Messrs. Vilmorin, Andrieux et Cie., Paris, France, the noted breeders of sugar beets, the varieties being Vilmorin's Improved A, Vilmorin's Improved B, and Klein Wanzleben, all leading varieties for factory purposes.

The locations of the Experimental Farms and Stations at which this inquiry was conducted are as follows: Charlottetown, P.E.I.; Kentville and Nappan, N.S.; Fredericton, N.B.; Lennoxville, Cap Rouge, and Ste. Anne de la Pocatière, Que.; Ottawa, Ont.; Brandon, Man.; Rosthern, Scott, and Indian Head, Sask.; Lacombe and Lethbridge, Alta.; Agassiz, Sidney, and Invermere, B.C.

In the following table the results of analysis, together with certain other important data necessary for an opinion as to the value of the crop for sugar production, are set forth. With few exceptions, notably at Rosthern, Sask., and Lacombe, Alta., the results are eminently satisfactory, indicating beets of high quality both as to sugar content and purity.

SUGAR BEETS grown on the Dominion Experimental Farms, 1915.

Variety.	Locality.	Percentage of Sugar in Juice.	Percentage of Solids in Juice.	Coefficient of Purity.	Average weight of One Root.	Yield per Acre.
		p. c.	p. c.	p. c.	Lb. Oz.	Tons. Lb.
Vilmorin's Improved A	Charlottetown, P.E.I	21·0	22·08	95·1	2 2	11 500
	Kentville, N.S	17·8	18·24	97·6	0 11	12 948
	Nappan, N.S	15·2	17·71	85·8	0 13	6 1,000
	Fredericton, N.B	17·7	18·78	94·3	0 15	8 1,720
	Lennoxville, Que	21·0	22·06	95·2	1 4	11 1,950
	Cap Rouge, Que	13·8			0 3	0 250
	Ste. Anne de la Pocatière, Que.	16·7	18·46	90·5	0 12	4 1,250
	Ottawa, Ont	18·0	19·68	91·5	1 5	17
	Brandon, Man	17·3	20·42	84·7	2 2	14 1,970
	Rosthern, Sask	10·1	14·65	69·0	1 8	5 1,560
	Scott, Sask	14·0	17·80	78·1	1 4	13 1,390
	Indian Head, Sask	19·8	22·13	89·5	1 6	9 600
	Lacombe, Alta	8·8	12·17	71·9	1 14	9 1,932
	Lethbridge, Alta. (Irrigated)	18·1	21·58	83·9	1 9	17 1,500
	" (Non-irrigated)	18·6	22·28	83·5	2 0	13 1,800
	Agassiz, B.C	18·5	20·63	89·7	1 15	15 1,600
	Sidney, B.C	19·3	20·77	92·9	1 1	20 1,900
	Invermere, B.C	20·3	20·89	97·1	0 15	8 1,485
Vilmorin's Improved B	Kentville, N.S	18·4	18·88	97·5	0 11	11 1,958
	Nappan, N.S	16·9	19·66	86·0	0 13	6 700
	Fredericton, N.B	18·2	19·00	95·8	1 0	8 560
	Lennoxville, Que	17·2	18·86	91·2	1 2	11 700
	Cap Rouge, Que	19·0			0 3	0 250
	Ste. Anne de la Pocatière, Que.	18·6	19·26	96·6	1 1	4 1,635
	Ottawa, Ont	16·8	18·07	93·0	1 6	17 125
	Brandon, Man	15·9	19·40	82·0	1 14	16 745
	Rosthern, Sask	10·1	14·85	68·1	0 15	3 311
	Scott, Sask	14·1	17·59	80·1	1 4	13 1,258
	Indian Head, Sask	19·2	20·93	91·7	1 3	8 1,400
	Lacombe, Alta	9·5	13·12	72·3	1 13	7 1,510
	Lethbridge, Alta. (Irrigated)	18·71	22·02	85·1	1 9	16 1,500
	" (Non-irrigated)	18·2	22·38	81·6	2 1	15 700
	Agassiz, B.C	17·3	19·30	89·9	2 2	15 450
	Sidney, B.C	19·1	21·24	89·9	1 3	24 1,000
	Invermere, B.C	18·5	20·88	88·6	1 5	9 957
Klein Wanzleben	Charlottetown, P.E.I	21·1	22·06	95·6	1 9	13 500
	Kentville, N.S	17·8	18·07	98·5	0 12	10 576
	Nappan, N.S	17·2	20·06	85·7	0 11	6 500
	Fredericton, N.B	16·6	18·25	91·0	1 4	9 400
	Lennoxville, Que	18·5	20·06	92·2	1 4	11 1,500
	Cap Rouge, Que	19·2			— 3	— 400
	Ste. Anne de la Pocatière, Que.	18·7	19·27	97·0	0 12	5 1,590
	Ottawa, Ont	17·1	18·06	94·7	1 4	19 700
	Brandon, Man	14·5	18·20	79·7	1 13	12 1,530
	Rosthern, Sask	10·0	14·25	70·2	1 11	4 1,438
	Scott, Sask	13·8	17·41	79·3	1 6	13 862
	Indian Head, Sask	17·8	19·97	89·1	1 5	9 850
	Lacombe, Alta	10·5	14·27	73·6	1 5	11 44
	Lethbridge, Alta. (Irrigated)	16·2	19·66	82·4	2 7	12 1,500
	" (Non-irrigated)	16·6	19·76	83·8	1 15	16 900
	Agassiz, B.C	17·5	18·71	93·5	1 12	14 1,600
	Sidney, B.C	18·7	19·84	94·2	0 15	15 80
	Invermere, B.C	17·9	20·3	88·1	1 7	8 1,460

The following notes, compiled from information furnished by the several Superintendents, will be of interest as indicating the nature of the soil and season at the several Farms and Stations at which the beets were grown.

Charlottetown, P.E.I.—The soil is a sandy loam in excellent condition, with a gravelly subsoil. The spring was late, but good growing weather prevailed during

June, July, and the first half of August. The precipitation the latter half of August and the first two weeks of September was very light, and this while reducing the yield was favourable to sugar production.

Sowing was on June 2; pulling on October 26. Two varieties only were grown, namely, Vilmorin's Improved A and Klein Wanzleben, and the yields obtained were, respectively, 11 tons 500 pounds and 13 tons 500 pounds per acre. The sugar content in both was very high—21 per cent, and the coefficient of purity most satisfactory, 95 per cent.

Kentville, N.S.—A rather poor sandy loam, naturally well drained. The area was fertilized with manure 15 tons, superphosphate 400 pounds, and ground limestone 1,000 pounds, per acre. Throughout the growing season the precipitation was sufficient and well distributed; drying winds were absent, and the hours of bright sunlight somewhat less than usual. On the whole the season must be considered as favourable to the growth of roots on well-drained soil.

Sowing was on May 18; pulling on October 14. Average yields were obtained, and the beets were of excellent quality, the sugar content being 17·8, 18·4, and 17·8 per cent, with a very high coefficient of purity in all three varieties.

Nappan, N.S.—A stiff clay loam of fair quality. The Superintendent writes respecting the season: "This has been possibly one of the most unfavourable seasons experienced for some years. The spring was exceptionally late. The temperature for the growing months was approximately the same, but the precipitation was heavier than last year (1914) and fell at such times as to prevent proper cultivation. As a result, exceptionally poor returns were obtained, not only with sugar beets, but all root crops."

Sowing was July 3; pulling on October 26. The yields were very low, namely, 6 tons 1,000 pounds, 6 tons 700 pounds, and 6 tons 500 pounds per acre. The sugar content was fair—15·2, 16·9, and 17·2 per cent—and the coefficient of purity decidedly low, 85·8, 86·0, and 85·7, respectively.

Fredericton, N.B.—A sandy loam, manured for corn in 1913, and again for turnips in 1914. In 1915, 16 tons of manure per acre was lightly ploughed in.

Though the precipitation in March was very light, the succeeding months of April, May, and June were very wet. The spring and early summer months, besides being characterized by heavy and frequent showers, were cool, with but little bright sunshine. July had fourteen rainy days and August thirteen, with 4·87 inches and 4·12 inches, respectively. September, October, and November were fine and warm.

Sowing was on June 2; pulling on October 15.

Nothwithstanding the unfavourable conditions prevailing in the spring and summer, the crop made a fair growth, and the excellent harvest weather produced a beet of very high quality, both as regards sugar content and purity.

Lennoxville, Que.—A clay loam of good quality. The precipitation was as follows: May, 1·72 inches, the greater part of which fell during the latter part of the month; June, 2·06 inches, well scattered throughout the month, which made it very favourable for the growth of the root crop; July, 4·80 inches, well distributed throughout the month; August, 3·47 inches, which fell on twelve days; September, 2·70 inches. The maxima and minima temperatures were: May, 82°; June 85° and 31°; July 87° and 40°; August, 85° and 30°; September, 89° and 24°; October, 73° and 19°. The season throughout must be considered as very favourable for the root crop.

Sowing was on May 25; pulling on October 20. The yields obtained were between 11 and 12 tons in each case.

In all three varieties the beets were of high quality, the sugar content being 21·0 per cent, 17·2 per cent, and 18·5 per cent, and the purity 95·2, 91·2, and 92·2. These data clearly indicate excellent roots for sugar production.

Cap Rouge, Que.—A deep, poor, sandy loam underlaid by shale. This soil was limed in the spring of 1915. Very light showers in May, accompanied by strong winds and conditions generally unfavourable to germination. The first rain in June was on the 12th (0·52 inch) and the total precipitation for the month was 2·63 inches, with strong winds. July was very dry, with only 1·68 inch. In August, 3·39 inches fell, and in September 5·31 inches, but this came too late to be of any use. The maximum temperature for the last eleven days of May was 69°, the minimum 32·20°. These are fairly normal records. In June the maximum was 85°, minimum 38·2°, mean 60·54°, which is a little higher than the average. In July the maximum was 85°, minimum 46·2°, mean 64,7. In August the maximum was 87°, the minimum 35·2°, mean 63·7° which is a little higher than normal.

Sowing was May 21; pulling on October 13. As regards yield, the crop was a total failure, the amounts being 250 pounds, 250 pounds and 400 pounds. The beets weighed only a few ounces each, which in two of the varieties showed a high sugar content.

We have to report, unfortunately, that sugar beets and indeed all root crops have been unsuccessful at the Station since the beginning of this inquiry in 1911.

Ste. Anne de la Pocatière, Que.—This is the first season that sugar beets have been grown at the Station. The yields were very poor, and the reasons assigned for the failure are: poor and unsuitable land, a very wet and cool spring delaying the sowing of the seed, and the persistent drought which followed. Sowing was on June 2, pulling October 29.

The sugar content in all three varieties was good, and the purity fair, so that with richer and better prepared land more favourable results may be looked for in the future.

Ottawa, Ont.—A moderately heavy sandy loam in a high state of fertility. The spring until the middle of June was decidedly dry, the precipitation being: March 0·67, April 0·99 and May 1·86 inch. In June, chiefly in the latter half, 2·94 inches of rain fell, and in July 2·12 inches, and good growth was made. August was very wet, with over 7 inches of rain. September was moderately warm.

In both sugar content and yield the results are excellent, confirming the conclusion reached from this examination commenced in 1902 that profitable yields of high quality beets could be grown in the Ottawa district.

Brandon, Man.—A heavy black clay loam, rich in humus and nitrogen. The spring was early and rather cool; June was very cold with repeated frosts and a rainfall slightly under the average; July, cool and very dry; August, dry with normal temperatures; and September was cool and showery.

Sowing was on May 10, and pulling on October 5.

The yields were very good, but the roots both in sugar content and purity were below the average. Evidently the cool showery weather of September militated against the satisfactory ripening of the beets. We have remarked in previous reports that it is only occasionally that beets of high quality are obtained in this district, and the reason therefor we believe are the excessive growth made in the early summer months and the immaturity of roots owing to the cool autumns which frequently obtain. For a high sugar content a moderately dry autumn with comparatively high temperature is required.

Rosthern, Sask.—A sandy loam of good quality. The lack of moisture prevented proper germination, but a good shower on May 15 followed and the plants were up on May 31. The whole season was marked by a scarcity of rain and sunshine and the prevalence of rather high winds.

Sowing was on May 8 and pulling September 23. The yield was very small.

The sugar content was very low and the quality poor. It has seldom, during the period of this investigation, that the seasonal conditions at this Station have been conducive to a satisfactory beet for factory purposes.

Scott, Sask.—A chocolate-coloured clay loam, manured and ploughed 8 inches deep in early spring. The precipitation during the early part of the season was quite satisfactory. The June rainfall was 3·54 inches, the highest recorded for this month at this Station. After July 15, however, no heavy rains occurred and the soil became very hard and dry towards the end of the summer. The season throughout was cool, the mean temperature for May, June, and September being lower than usual. August was moderately warm. Sharp frosts were recorded as late as June 16, and a killing frost occurred on September 11.

Sowing was on May 12 and pulling on October 14. The yields were very fair.

The beets were somewhat below the average in sugar content, with a fair coefficient of purity. This is the second season at this Station in this investigation, and the indications cannot be said to be very favourable for the production of high quality beets.

Indian Head, Sask.—A rich clay loam. The season generally was very favonrable to the growth of roots. The chief meteorological data of the growing season may be tabulated as follows:—

Month.	Highest Temperature.	Lowest Temperature.	Mean Temperature.	Rainfall.
	°	°	°	In.
May	77	13	50·10	1·37
June	80	26	53·53	2·32
July	84	33	58·32	1·92
August	95	34	64·60	1·75
September	80	25	47·23	3·90
October	70	18	42·13	0·24

Sowing was on May 13 and pulling on October 21.

The yields were only fair, but the quality in all three varieties was excellent.

Lacombe, Alta.—A rich black loam, with good natural drainage. The spring was cool with a very abundant rainfall. These conditions retarded early growth. Ideal growing weather prevailed in July but little rain fell until September. The autumn was cool with light showers.

Sowing was on May 8, pulling on October 8.

The yields were fairly satisfactory but the quality was very poor—the sugar content being the lowest in the series. Sugar beets were first grown at this Station in 1907, but in no year of the inquiry have good results been obtained, presumably due to adverse weather conditions for the proper ripening of the crop.

Lethbridge, Alta.—The soil was the chocolate-coloured loam characteristic of the district.

The rainfall for the growing season was only slightly higher than normal, but the showers were so well distributed that they seemed to do the maximum amount of good to all grain crops and, also, to a large extent, to root crops.

Month.	Rainfall — 1915.	Average for 14 Years.
	Inches.	Inches.
April	0·04	0·60
May	3·03	3·10
June	4·84	3·18
July	3·44	1·83
August	0·96	1·98
September	1·32	1·51

The roots on the "irrigated land" were not irrigated. The land on which they were grown was in grain in 1914, at which time it was heavily irrigated, in consequence of which there was doubtless much moisture stored in the soil.

Sowing was on May 5; pulling on November 2.

The beets on the "non-irrigated land" were grown on summer-fallow.

Both as to quality and yield the beets on both tracts were excellent.

Agassiz, B.C.—The soil was a sandy loam in excellent condition of tilth. The spring was early and June very wet, midsummer and until October was hot and very dry. Late autumn was very wet.

Sowing was on April 29, pulling on November 13.

The yields were good and the quality of the beets both as to sugar content and purity was excellent.

Sidney, B.C.—A clay loam, with a certain proportion of gravel. The season opened early, and growth was excellent till July. Then a dry period ensued extending into September. The autumn was wet and cool. The highest temperature recorded was 92° F. Night frosts occurred before harvesting the crop.

Sowing was on April 30, pulling on November 18.

The yields were very good and all three varieties gave returns considerably above the average, both for sugar and purity.

Invermere, B.C.—A sandy loam of only fair quality, with "morain" subsoil. The season on the whole was exceptionally favourable, the rainfall throughout the season being sufficiently copious and regular as to render irrigation unnecessary. There was no frost recorded between May 29 and September 11.

Sowing was on May 19, and pulling on October 13.

The yields were very poor, but the quality of the beets, both as to sugar content and purity, was excellent.

In the following table we present the averages as regards sugar content in juice for the period 1902-15, obtained at the several localities included in this investigation:—

AVERAGE PERCENTAGE OF SUGAR in Juice in Sugar Beets grown on Dominion Experimental Farms, 1902-1915.

Locality.	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915
Charlottetown, P.E.I.	.....	.....	.....	.....	.....	.....	.....	.....	14·25	17·23	15·31	15·63	17·94	21·05
Kentville, N.S	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	17·17	17·07	18·00
Nappan, N.S.	15·87	15·33	14·41	16·52	17·08	.....	17·53	16·74	16·43	17·56	16·68	19·17	17·79	16·45
Fredericton, N.B.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	15·98	17·15
Lennoxville, P.Q.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18·90
Cap Rouge, P.Q.	.....	.....	.....	.....	.....	.....	.....	.....	.....	16·16	14·92	19·94	14·38	17·33
Ste. Anne de la Pocatière, P.Q.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18·00
Ottawa, Ont.	16·77	15·34	16·91	12·45	14·37	15·44	16·30	14·84	16·44	.....	17·59	16·48	19·84	17·30
Brandon, Man.	.....	11·36	16·62	11·09	15·50	16·99	15·82	18·83	18·40	13·50	13·40	13·92	12·06	15·90
Rosthern, Sask.	.....	.....	.....	.....	.....	.....	.....	.....	.....	13·30	14·63	15·61	12·69	10·06
Scott, Sask.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	14·67	13·96
Indian Head, Sask.	15·15	16·54	15·24	14·94	14·91	15·92	15·66	17·16	.....	14·48	15·78	20·73	16·54	18·93
Lacombe, Alta.	.....	.....	.....	.....	.....	13·34	11·21	12·77	12·69	.....	.....	12·67	.....	9·56
Lethbridge, Alta. (Irrig.)	.....	.....	.....	.....	.....	.....	16·09	17·91	.....	17·02	17·41	19·54	12·95	18·33
Lethbridge, Alta. (Non-irrig.)	.....	.....	.....	.....	.....	.....	16·73	18·36	.....	14·05	17·68	19·33	14·23	18·43
Agassiz, B.C.	.....	17·41	8·10	17·32	14·28	17·65	17·15	18·30	19·18	19·95	11·53	18·08	17·07	17·76
Sidney, B.C.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	15·20	19·03
Invermere, B.C.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	19·04	18·90

Ronalane, Alta, Laboratory No. 25709.—Klein Wanzleben V, grown by the Southern Alberta Land Company on plots devoted to "Duty of Water Tests." Spring ploughed 9 inches and immediately harrowed. Sown April 22, cultivated June 7 and July 1. Irrigated July 22. Harvested October 18. Average acre-feet of water, 2·24. Average yield (from three plots) 13·7 tons per acre.

The roots, as received, were rather small but of good shape. They had been too severely "topped" and in some, in consequence, decay had set in.

Analysis.

Percentage of sugar in juice	19·53 per cent.
Coefficient of purity	79·25 " "
Average weight of one root	1 pound, 1 ounce.

The sugar content is seen to be satisfactory, though the purity is rather low—due possibly, in part, to the unsound condition of several of the roots analysed. The indications are that a crop quite suitable for factory purposes might be grown in this district.

Kamloops, B.C., Laboratory No. 25746.—Vilmorin's Improved, grown by C. R. Lee, ten miles from Kamloops, and forwarded by the Kamloops Agricultural Association. No particulars of growth nor data as to yield were received.

The roots, three in number, were very large, but of fair shape.

Analysis.

Percentage of sugar in juice	19·08 per cent.
Coefficient of purity	83·08 " "
Weight of one root	4 pounds, 13 ounces.

These beets show a high sugar content and a very satisfactory coefficient of purity; they would be eminently suitable for sugar production.

THE RELATIVE VALUE OF FIELD ROOTS.

In recent years the farmer has been paying greater attention to the composition of the milling by-products he has purchased, and which are necessary to supplement the home-grown fodders in order to make a "balanced ration." In this he does wisely, as thereby he can often effect a very considerable economy in his feeding. The same principle is applicable, though perhaps not in the same manner or degree, to the fodders and feeding stuffs grown on the farm.

It will be clear that the more nutritious the home-grown fodders the less outlay for the meals, etc., generally known as "concentrates" will be necessary to "balance" the ration. Too little attention in the past has been paid to this matter, and we feel assured that the farmer will do well to give it more thought. It is one in which he must look after his own interest; there is no law, as in the case of commercial feeding stuffs, to safeguard him, though there is information obtainable that will assist him. Hay, roots, ensilage, etc., are all variable in composition and hence in nutritive qualities, and thus it behooves the farmer to see to it that as far as practicable the varieties he sows are of the best obtainable. In this chapter we call attention, in this connection, to an important constituent in the ration of nearly all classes of live stock, namely, farm roots.

For a number of years past we have been accumulating analytical data with respect to mangels, sugar beets, turnips and carrots, and these data have clearly shown that large differences in composition between varieties of the same class of farm roots may and do exist. The percentage of dry matter, which in roots is a very good measure of feeding qualities, may in one variety or strain of mangels be twice that in another, and it is this fact that makes it desirable for the farmer, in making his selection of varieties

to grow, to consult such records as we now present. There are, of course, other properties or factors that should be taken into account in making a selection, such as yield per acre, cost of production and harvesting, and keeping qualities, but the nutritive value as deduced from the results of analysis should not be overlooked. The present chapter gives the results of this inquiry as obtained from the several classes grown on the Central Farm, Ottawa, during the season of 1915.

MANGELS.

The series submitted to analysis comprised thirty-six varieties, several of which were grown for the first time at Ottawa. The varieties have been placed in table I in the order of their richness in dry matter, in addition to which the percentage of sugar—the most important nutrient in roots—is given, and the average weight of root. This latter is of value, since in roots of the same variety it frequently happens that extraordinary size is obtained at the expense of dry matter, or, put otherwise, the larger the root, within limits, the lower the feeding value.

TABLE I.—Analysis of Mangels, Central Experimental Farm, Ottawa, Ont., 1915.

Variety.	Water.	Dry Matter.	Sugar in Juice.	Average Weight of One Root.	
	p. c.	p. c.	p. c.	Lb.	Oz.
Taaroji	87·00	13·00	5·66	4	3½
Gate Post	88·59	11·41	4·15	2	15
Red Emperor	88·83	11·17	6·00	2	5
Royal Giant	89·65	10·35	5·08	3	8
Yellow Short Ovid Giant	89·80	10·20	.....	3	3½
Danish Sludstrup	89·89	10·11	4·37	4	1
Mammoth Yellow Intermediate	89·98	10·02	4·49	3	6½
Yellow Long Ovid Mammoth	89·99	10·01	3·87	4	½
Giant Half Sugar White	90·08	9·92	5·29	3	2
Elvetham Mammoth	90·09	9·91	4·89	3	11½
Svalof Alfa	90·16	9·84	2·86	4	1½
Prize Mammoth Long Red	90·17	9·83	4·48	3	6
Weibull's Eckendorffer Red	90·18	9·82	4·58	3	7½
Weibull's Tjusrod	90·22	9·78	5·39	3	6½
Perfection Mammoth	90·56	9·44	5·49	3	4
Mammoth Long Red	90·60	9·40	.....	3	4½
Yellow Leviathan	90·83	9·17	5·00	3	13½
Improved Mammoth Saw Log	90·87	9·13	5·00	3	6
Sludstrup Barres	90·92	9·08	.....	4	1½
Giant Yellow Intermediate	91·06	8·94	4·38	4	2
Leviathan	91·23	8·77	4·29	3	4½
Giant Yellow Half Long	91·33	8·67	4·78	3	8
Sludstrup A	91·42	8·58	.....	3	3½
Giant Half Sugar	91·42	8·58	4·79	3	2
Taaroji Barres	91·58	8·42	4·70	3	3½
Windsor Yellow Globe	91·70	8·30	3·27	3	15
Giant Yellow Globe	91·79	8·21	3·31	2	12½
Weibull's Cylinder Barres	91·81	8·19	3·17	3	13
Weibull's Eckendorffer Gul	91·83	8·17	3·89	3	8
Yellow Intermediate	91·85	8·15	3·66	4	11½
Weibull's Eckendorffer Rod	91·86	8·14	3·79	3	10
Golden Tankard	91·89	8·11	3·60	3	3½
Sludstrup, B	91·90	8·10	3·18	4	15
Danish Eckendorffer	92·14	7·86	.....	3	5
Selected Yellow Globe	92·18	7·82	3·78	3	8
Red Windsor	92·68	7·32	2·86	3	8

The richest root contains 13·0 per cent dry matter and 5·66 per cent sugar, while the poorest in the series, 7·32 per cent and 2·86 per cent respectively. These are great and important differences, representing, as they do, real differences in feed-

ing value. We might say that approximately the former was worth, weight for weight, twice the latter. One variety only possesses 13·0 per cent dry matter, two between 11 per cent and 12 per cent, five between 10 per cent and 11 per cent, eleven between 9 per cent and 10 per cent, fourteen between 8 per cent and 9 per cent, and three between 7 per cent and 8 per cent.

TABLE II.—Mangels—Yield and Average Composition, 1904-1915.

Year.	Number of Varieties Analysed.	Average Weight of One Root.		Yield per Acre.		Dry Matter.	Sugar.
		Lb.	Oz.	Tons.	Lb.	p. c.	p. c.
1904	10	2	11	30	1,277	11·69	6·62
1905	17	3	9	39	369	10·04	4·67
1906	16	2	7	31	159	11·63	5·93
1907	10	2	11	27	680	12·64	7·46
1908	12	2	2	23	690	11·87	5·33
1909	14	3	5	28	920	11·21	6·21
1910	8	5	10	56	57	10·04	4·46
1912	23	2	9	29	61	9·51	6·43
1913	13	2	14	.....		10·51	5·63
1914	24	2	1	23	50	12·79	7·75
1915	36	3	9	36	1,157	9·25	4·27
Average for 11 years	.....	3	12	32	1,904	11·02	5·89

The averages for dry matter and sugar for 1915 are distinctly lower than those for the eleven-year period during which this investigation has been carried on; indeed they are the lowest in the series, though closely approximated by the results for 1910. Although the character of the season during the maturing of the roots undoubtedly had a depressing influence on the quality of the mangels—rainy weather prevailing—the averages have assuredly been affected by the introduction into the series of a number of new varieties of more or less low feeding quality.

Influence of Heredity in Mangels.

To ascertain how far the composition of mangels might be influenced by inherited or transmitted characters, we selected in 1900 two widely known and popular varieties of mangel—Gate Post and Giant Yellow Globe—varieties which showed at the outset considerable difference in dry matter and sugar content, and typical of the best and poorest mangels. These have been grown annually since that date side by side on the same soil and with same culture on the Central Farm, Ottawa, thus eliminating what might be considered disturbing influences of soil and season, and analysed. The results for the sixteen-year period of the investigation are tabulated as follows:

TABLE III.—Dry Matter and Sugar in Gate Post and Giant Yellow Globe Mangels.

Season of Growth.	Gate Post.				Giant Yellow Globe.			
	Average Weight of One Root.		Dry Matter.	Sugar in Juice.	Average Weight of One Root.		Dry Matter.	Sugar in Juice.
	Lb.	Oz.	p. c.	p. c.	Lb.	Oz.	p. c.	p. c.
1900	..	..	11·14	6·15	..	..	8·19	2·64
1901	2	9	9·41	4·15	3	3	9·10	4·08
1902	3	2	13·90	9·39	3	9	10·24	5·24
1903	3	3	12·93	7·38	3	13	10·89	6·17
1904	2	14	12·64	7·62	2	13	9·24	5·26
1905	2	13	12·07	6·83	3	12	8·64	3·55
1906	2	2	12·90	6·59	1	8	12·73	6·45
1907	3	10	12·53	7·25	2	7	10·78	6·34
1908	1	11	12·02	4·94	2	4	10·66	4·47
1909	3	14	11·82	6·64	3	7	10·95	5·82
1910	6	8	9·59	4·26	6	13	7·80	2·74
1911	2	11	10·04	3·86	3	1	6·66	1·85
1912	3	5	8·98	5·05	3	2	7·87	4·75
1913	3	5	10·98	6·27	2	15	8·90	5·18
1914	2	11	14·40	8·00	2	1	11·16	6·32
1915	2	15	11·41	4·15	2	12	8·21	3·31
Average for 16 years	..	.	11·67	6·16	3	4	9·50	4·63

Throughout the whole period, without a single exception, the Gate Post has proved the superior variety; results have varied from season to season and neither variety has exhibited any marked constancy in composition, indicating the influence of seasonal conditions, but invariably, the Gate Post has been the richer of the two. The averages for the sixteen-year period show that Gate Post would furnish about 23 per cent more dry matter and 33 per cent more sugar, weight for weight, than Giant Yellow Globe—differences in feeding values of very considerable importance.

TURNIPS.

The series comprises thirty-three varieties, a number of which were grown for the first time on the Central Farm in 1914. Of these, five contained more than 11 per cent dry matter, twelve between 10 per cent and 11 per cent, eight between 8 per cent and 9 per cent, three between 7 per cent and 8 per cent, and three between 6 per cent and 7 per cent. The results are given in detail in the following table:—

TABLE IV.—Analysis of Turnips, Central Experimental Farm, Ottawa, Ont., 1915.

Variety.	Water.	Dry Matter.	Sugar in Juice.	Average Weight of One Root.	
	p. c.	p. c	p. c.	Lb.	Oz.
Skirvings	88·42	11·58	1·64	2	—
Best of All	88·44	11·56	1·42	2	7
Weibull's Bangholm	88·49	11·51	1·02	2	4½
Lapland	88·59	11·41	1·54	2	—
Empress	88·75	11·25	1·23	2	13
Carter's Prize Winner	89·24	10·76	1·23	2	10
Hartley's Bronze Top	89·31	10·69	1·22	2	3½
New Century	89·43	10·57	1·23	2	11
Corning's Lapland	89·48	10·52	1·53	2	—
Halewood's Bronze Top	89·52	10·48	1·22	2	4½
Canadian Gem	89·55	10·45	1·63	2	9
Derby	89·60	10·40	1·13	2	13½
Good Luck	89·67	10·33	1·53	2	—
Olsgaard Bangholm	89·78	10·22	1·23	2	11
Weibull's Svensk Slat	89·91	10·09	1·33	2	8½
Perfection	89·94	10·06	1·63	2	2½
Hazard's Improved	89·98	10·02	1·43	2	2
Shepherd's Golden Globe	90·10	9·90	1·24	2	8½
Halls's Westbury	90·44	9·56	·92	2	13
Magnum Bonum	90·54	9·46	1·45	2	9½
Bangholm	90·58	9·42	1·43	1	15
Carter's Imperial	90·58	9·42	1·32	2	5½
Durham	90·60	9·40	1·24	2	10
Jumbo	90·62	9·38	1·43	2	6
Paidberg Bangholm	90·82	9·18	1·12	2	10½
Kangaroo	91·23	8·77	1·44	3	2
Dale's Hybrid	91·84	8·16	1·23	2	2½
Weibull's Sekel	92·13	7·87	1·02	2	—
Danish Yellow Tankard	92·19	7·81	1·13	1	14
Greystone	92·27	7·73	1·22	2	9
Weibull's Pedigree Bortfelder	93·37	6·63	1·03	1	10
Fjusk Bortfelder	93·47	6·53	1·22	2	7
Weibull's Ostersundom	94·00	6·00	1·02	1	12

Between the richest and the poorest of the series there is a difference of 5·58 per cent dry matter, which, if we assume that the feeding value is measured by the percentage of dry matter, means that 2,000 pounds of the best variety are equivalent to 3,860 pounds of the poorest.

As in the past years, the sugar content throughout is fairly constant; in this respect the varieties of turnips differ from those of mangels. It averages, approximately, one-fifth that of mangels.

The average results for the past ten years are presented in Table V.

TABLE V.—Turnips, Yield and Average Composition, 1905-15.

Year.	Number of Varieties. Analysed.	Average Weight of One Root.		Yield per Acre.		Dry Matter.	Sugar.
		Lb.	Oz.	Tons.	Lb.	p. c.	p. c.
1905	20	2	13	30	1,060	10·09	1·10
1906	20	1	10	15	1,890	12·18	1·78
1907	14	3	5	33	142	10·14	1·11
1908	13	3	12	27	1,033	9·87	1·52
1909	13	2	10	29	542	11·30	1·43
1910	10	3	11	31	565	10·87	1·07
1912	19	3	12	33	155	8·65	1·10
1913	19	2	14	24	1,271	9·58	1·54
1914	30	2	0	22	130	9·68	·76
1915	33	2	6	19	1,522	9·60	1·29
Average for 10 years	.....	2	14	26	1,530	10·20	1·27

For the past three seasons the average dry-matter content has remained practically constant and is somewhat lower than that for the ten-year period. The average sugar content for 1915 may be regarded as identical with that of the experimental period. It is noteworthy that excepting the crop of 1914, the data indicate an almost uniform sugar content, approximating 1·25 per cent.

CARROTS.

Ten varieties of carrots were submitted to analysis, the difference in dry matter between the best and poorest of the series amounting to 2·84 per cent. Basing the feeding value simply on the dry-matter content, this would indicate that 2,000 pounds of the former would be equivalent to 2665 pounds of the latter.

TABLE VI.—Analysis of Carrots, Central Experimental Farm, Ottawa, Ont., 1915.

Variety.	Water.	Dry Matter.	Sugar. in Juice.	Average Weight of One Root.	
	p. c.	p. c.	p. c.	Lb.	Oz.
Nantes	88·62	11·38	2·23	0	5
Ontario Champion	89·54	10·46	2·01	0	10
White Belgian	89·58	10·42	1·72	0	6
Giant White Vosges	89·66	10·34	1·73	0	5½
James	89·69	10·31	2·12	0	6
Champion	89·92	10·08	1·52	0	7
Carter's Orange Giant	90·04	9·96	1·63	0	7½
Svalof White Intermediate	90·26	9·74	1·93	0	8
Mammoth White Intermediate	90·54	9·46	2·01	0	6
Improved Short White	91·46	8·54	1·72	0	8

Averages for the past ten seasons are given in the following table, which shows that the carrots of 1915 were a little lower in dry-matter content and decidedly poorer in sugar, when compared with the average results for the experimental period.

TABLE VII.—Carrots—Yield and Average Composition, 1905-15.

Year.	Number of Varieties Analysed.	Average Weight of One Root.		Yield per Acre.		Dry Matter.	Sugar.
		Lb.	Oz.	Tons.	Lb.	p. c.	p. c.
1905	11	1	3	25	1,510	10·25	2·52
1906	10	1	2	19	1,605	10·59	3·36
1907	6	1	1	24	1,517	10·30	3·62
1908	6	1	3	22	133	10·89	3·34
1909	6	1	0	17	1,680	10·40	2·30
1910	5	1	9	13	1,640	10·17	3·23
1912	6	1	1	18	545	10·50	2·54
1913	6	1	8	24	1,100	9·11	2·11
1914	8	0	10	21	1,359	11·42	2·62
1915	10	0	6	16	1,500	10·08	1·86
Average for 10 years	.....	1	2	20	1,058	10·37	2·69

The average comparative composition as regards dry matter and sugar, of these three classes of roots, as obtained from this investigation, is shown in the following table:—

AVERAGE Composition of Mangels, Turnips and Carrots.

Class of Roots.	Average for period of	Dry Matter.	Sugar.
		per cent.	per cent.
Mangels	11 years	11·02	5·89
Turnips	10 "	10·20	1·27
Carrots	10 "	10·37	2·69

FODDERS AND FEEDING STUFFS.

BRAN.

Laboratory No. 25411-2.—Two samples of bran examined for the Farmers' Club of Merrickville, Ont. Their analyses afforded the following data:—

	No. 1.	No. 2.
Moisture	8·45	7·86
Protein	14·25	14·20
Fat	3·68	4·86
Carbohydrates	59·66	56·05
Fibre	8·59	11·68
Ash	5·37	5·35
	100·00	100·00

No. 1 was practically free from weed seeds; No. 2 contained a considerable number of the seeds of wild buckwheat, lambs' quarters, and wild oats.

Though the protein content of these two brans is practically identical, we consider No. 1, in spite of its lower percentage of fat, the superior sample. This conclusion is based on the fact that No. 2 is much higher in fibre and contains a considerable admixture of weed seeds. The prices as quoted were: No. 1, $23; No. 2, $22 per ton.

BARLEY FLOUR: OAT FLOUR.

Laboratory Nos. 24289-90.—Forwarded from Woodstock, Ont., and stated to be by-products from the Archibald Cereal Mills Co., Beachville, Ont.

Barley flour: From the manufacture of Pot barley, "consisting of the ends of the kernel and the polishing of the barley proper":—

	Per Cent.
Moisture	9·44
Protein	16·44
Fat	5·14
Carbohydrates	56·76
Fibre	7·42
Ash	4·80
	100·00

Oat flour: A by-product in the manufacture of rolled oats:—

	Per Cent.
Moisture	7·95
Protein	17·25
Fat	7·83
Carbohydrates	60·93
Fibre	3·44
Ash	2·60
	100·00

These data would indicate mill feeds of very considerable nutritive value.

CHICK FEEDS.

Two "chick feeds" examined at the request of the Poultry Division.

Laboratory No. 17322.—"Royal Canadian," Graham Bros., Ottawa, said to consist of peas, rice, wheat, and corn.

Laboratory No. 17323.—Chick feed, manufactured by Park and Pollard, Boston, Mass., and stated to contain, among other ingredients, oil cake and fish scrap:—

	Lab'y No. 17322	Lab'y No. 17323
Water	9·18	9·77
Protein	11·10	14·60
Fat	5·88	3·60
Carbohydrates	68·76	66·05
Fibre	2·34	2·81
Ash	2·74	3·17
	100·00	100·00

In protein, No. 17323 is decidedly the richer and therefore, we might suppose, for tissue building, the superior. In fat, however, No. 17322 takes the first place, being some 2 per cent higher in this constituent than No. 17323. As regards fibre, the feeds are equally satisfactory.

Poultry authorities differ as to the proportions of protein, fat, and fibre that should be present in an ideal chick feed, but from practical trials both the feeds here reported upon have been pronounced satisfactory.

FEED.

Laboratory No. 25767.—This is a by-product from the manufacture of the breakfast food known as "Force," and sold at $25 per ton:—

Water	6·78
Protein	10·65
Fat	2·66
Carbohydrates	69·18
Fibre	7·39
Ash	3·34
	100·00

Microscopic examination indicates that it is essentially a by-product of wheat. There were, however, in the sample a number of other kernels.

The data indicate that it is not a feeding stuff of high nutritive value; in both protein and fat it is distinctly inferior to bran.

RICE MEAL.

Laboratory No. 25543.—Forwarded from Danville, Que., with a request for information as to its character, etc., but no particulars as to where it was milled could be obtained by our correspondent:—

	Per cent.
Moisture	7·14
Protein	12·71
Fat	11·55
Carbohydrates	55·79
Fibre	5·04
Ash	7·77
	100·00

These results are in accord with those of rice meal of good quality, though the fibre is somewhat higher than in first-class brands.

Rice meal, when genuine, is generally considered a nutritive and wholesome feed and judiciously used had given good results in the feeding of both dairy cattle and pigs.

FLAX PRODUCTS.

Two samples of flax by-products—flax chaff and flax shives—were received from the secretary of the Canadian Flax Growers' Association, St. Mary's, Ont., with a request for a report on their food value.

Laboratory No. 25165.—Flax chaff, this sample consists essentially of the broken bolls or capsules of the flax seed, commonly known as flax chaff, but there is also present a certain amount of flax stems or straw. There was no flax seed present.

Laboratory No. 25165.—Flax shives. This consists entirely of fragments of broken flax straw.

	Lab'y No. 25165.	Lab'y No. 25166.
Water	5·02	4·57
Protein	10·40	2·15
Fat	1·64	2·02
Carbohydrates	32·67	22·56
Fibre	35·95	64·55
Ash	14·32	2·15
	100·00	100·00

Flax Chaff.—Though possessing a fair percentage of protein, we are of the opinion that this product is of a very doubtful feeding value. It has a very low fat content and is very high in fibre. It is harsh in nature, and its unpalatability is accentuated by a certain amount of flax straw—a mixture of peculiarly coarse and brittle nature. It would, we believe, be largely rejected by cattle, and if eaten in small quantities it is of such an indigestible character that we could not speak at all hopefully as to any future for it as a feeding stuff.

Flax Shives.—The chemical analysis and the physical character of this product alike indicate that it is valueless as a feeding stuff. Its very low protein and fat content and its extremely high proportion of fibre, coupled with its very coarse and extremely harsh nature, render it quite unsuitable and indeed worthless for feeding purposes.

TRUMILK WASTE.

Laboratory No. 20922.—This is a waste or by-product in the manufacture of Trumilk by the Canadian Milk Products, Toronto, and was forwarded for trial in poultry feeding.

The analysis of this sample afforded the following data:—

	Per cent.
Water	1·54
Protein (casein)	26·50
Fat	2·32
Carbohydrates (milk sugar)	62·32
Ash	7·32

This product is characterized by a high protein content, but the proportion of fat is decidedly low. It should therefore be used, essentially, as a source of protein and supplemented by feeds richer in fat. In that way, if the price permitted, we think it could be advantageously used in poultry feeding.

FOX BISCUITS.

The relative nutritive value of certain biscuits used in the feeding of black foxes on Prince Edward Island has been ascertained, the inquiry being undertaken at the request of a number of breeders.

Laboratory No. 25547.—Christie's Kennel Biscuit. Hard dark-brown biscuit from half to three-quarters of an inch in thickness; interior, yellowish brown and showing a fair number of large pieces of meat, rather porous or open in structure.

Laboratory No. 25548.—Cod-oil Biscuit, manufactured in New York—Hard biscuit, light brown throughout, about half an inch in thickness, of close texture and showing some meat in very small pieces.

Laboratory No. 25549.—Island Fox Biscuit, manufactured in Prince Edward Island. Hard dark-brown biscuit, with interior lighter in colour and somewhat open in structure.

Analyses.	No. 25547	No. 25548	No. 25549
Water	8·11	7·55	8·92
Protein	22·27	18·47	19·45
Fat	6·77	4·82	7·06
Carbohydrates	58·84	58·89	60·63
Fibre	1·00	1·15	1·71
Ash	3·01	9·12	2·23
	100·00	100·00	100·00

From the standpoint of protein content, No. 25547 stands first, No. 25549 second, and No. 25548 third. In fat, No. 25547 and 25549 are almost equal and superior to No. 25548, which stands third in order.

All the biscuits were sound, and apparently palatable.

ELEVATOR DUST.

Laboratory No. 25527.—This sample of "Dust" was from the Monitor secured at the "W.G." elevator at Fort William, Ont. It is a fine light brown meal, not unlike fine bran, but not so heavy.

Analysis.	
Water	7·14
Protein	14·31
Fat	4·77
Carbohydrates	60·76
Fibre	9·70
Ash	3·32
	100·00

According to these results this material should have a fair feeding value; in protein, fat, and fibre the data approach those of bran. Judging from the appearance of the feed we should expect that it would be found to be palatable by stock, but no direct information on this point could be secured.

THE FEEDING VALUE OF MANGELS USED IN SEED PRODUCTION.

These mangels (variety, Mammoth Long Red) had been grown on the Experimental Farm, Ottawa, in the season of 1914 and reserved for seed-producing purposes. They were re-planted in May, 1915. All the roots planted did not bear seed, but all increased in size and weight very considerably. Specimens of seed-bearing and barren roots were collected August 28 and submitted to analysis to ascertain their probable feeding value.

A. Roots which did not form a seed stock. These roots were very large and of abnormal shape, and bore several "heads." Several of the roots were partly hollow.

B. Roots which had produced seed. These roots were not so large as those in sample A, but nevertheless were larger and heavier than when planted. They were fairly uniform in shape, solid and sound.

	A	B
	Lb. Oz.	Lb. Oz.
Weight of 1 root	6 13	4 4
	per cent	per cent.
Dry matter	9·76	8·66
Sugar in juice	4·05	3·58

The analysis shows a considerable falling-off both in dry matter and sugar when compared with the figures for the same roots harvested the autumn previous. Nevertheless, the present results indicate an appreciable nutritive value, provided the roots were found palatable. These "twice-grown" roots, however, are unfortunately very hard and fibrous, and it was only with difficulty that the stock (dairy cattle) could be induced to eat them.

FERTILIZING MATERIALS.

LIMESTONE.

There is probably no question relating to soil improvement that is receiving in Canada to-day more attention than that of the functions of lime and lime compounds. Particularly is this the case in Ontario, Quebec, the Maritime Provinces, and British Columbia. This interest has been steadily increasing during the past three years, and our correspondence on this subject during the year just closed has been particularly large. The whole subject is one of the greatest importance, and we earnestly advocate its careful study on the part of farmers. We have emphasized the fact that there is a use and a misuse of lime, that unless rationally employed the immediate advantage may be followed by decreased yields due to soil impoverishment. To furnish information that may help the farmer to an understanding of the whole subject and to assist him in a judgment as to the desirability of an application of lime or ground limestone on any particular soil, Bulletin No. 80, entitled "Lime in Agriculture" has been written, copies of which are still available and may be obtained on application. It discusses very fully all the more important phases—chemically, physically and biologically—of the question, and we commend its perusal to farmers.

It would seem that in many districts ground limestone is likely to become more popular than quick or slaked lime, partly on the ground of its lower cost (though such is not invariably the case on the basis of its lime content) and partly because it is a safer form to use on light sandy loams and those poor in organic matter. Carbonate of lime (limestone and marl) is much milder in its action than quicklime, and though not so quick in its action an excess can do little or no harm. It should be added that for heavy clay soils, quick or slacked lime is to be preferred.

In the table accompanying this chapter the composition is given of a number of limestones from various parts of Canada analysed during the past years. The larger number of these were at the request of Provincial Agricultural authorities, but some were sent in by farmers or associations of farmers who were about to install a crushing plant or erect a kiln for burning the stone to quicklime. When a sample of limestone was submitted in a crushed or ground form, a mechanical analysis, in addition to the chemical examination, was made.

Lab'y No.	Locality of Occurrence.	Name of Sender.	Mineral matter insoluble in acid.	Oxide of Iron and Alumina (Fe^2O^3+ Al^2O^3).	Carbonate of Lime ($CaCO^3$).	Carbonate of Magnesia, etc. (by difference)
			p.c.	p.c.	p.c.	p.c.
20123	Foster's Quarries, Merrivale, Ont.	M. A. Lathey	19·65	4·73	72·94	2·68
20124	Foster's Quarries, Merrivale, Ont.	M. A. Lathey	8·05	3·05	88·25	0·65
20846	Kirkfield, Ontario	Crushed Stone, Ltd	15·68	3·36	77·98	2·98
20866	Montreal, Que.	Stinson-Reeb Builders' Supply Co	15·53	2·81	76·91	4·75
20884	Torryburn, N.B.	W. W. Hubbard	5·45	0·66	93·15	0·74
20894	Hensall, Ont.	S. Cudmore	13·60	1·99	72·67	7·86
20919	Morin Heights, Que.	F. G. Todd	28·42	1·08	70·78	.....
20919(a)	Morin Heights, Que.	F. G. Todd	22·65	1·05	76·35	.....
21029	Kirkfield, Ont.	E. S. Hodges	11·62	1·95	81·94	4·49
21144(1)	Demoiselle Creek, N.B.	R. Newton	5·40	1·70	92·75	0·15
21144(2)	Demoiselle Creek, N.B.	R. Newton	18·00	2·60	79·37	0·03
21145(a)	Hillsboro Quarry, N.B.	R. Newton	10·10	1·85	86·75	1·30
21145(b)	Hillsboro Quarry, N.B.	R. Newton	15·10	1·95	82·75	0·20
21146	Upper Dorchester, N.B.	R. Newton	12·10	1·30	84·00	2·60
21147	Riverside, N.B.	R. Newton	24·50	2·65	70·75	2·10
21180	Marble Mountain, C.B., N.S.	John Mackenzie	19·23	4·38	72·75	3·64
22014	Kirkfield, Ont.	Crushed Stone, Ltd	10·22	1·78	86·25	1·75
22019	Ebor, Manitoba	J. J. Cocksedge	25·45	4·50	65·00	5·05
22402	Windsor, N.S., Eastern Lime Co.	W. S. Blair	5·35	1·20	92·50	0·95
22406	Elgin, N.B.	R. Newton	2·75	0·78	95·31	1·16
22407	Mapleton, N.B.	R. Newton	3·10	1·02	95·06	0·82
22408(1)	Petersville, N.B.	R. Newton	4·55	1·50	93·12	0·83
22409(2)	Petersville, N.B.	R. Newton	6·59	1·42	91·18	0·83
22420	Havelock, N.B.	R. Newton	1·60	1·13	96·97	0·30
22583	Taylor Village, N.B.	R. Newton	3·58	0·75	93·87	1·80
22584	Taylor Village, N.B.	R. Newton	2·31	0·54	96·25	0·90
22822	Chaffey's Locks, Ont.	M. Sleeman	4·87	0·52	92·25	2·36
23035	Surrey Centre, B.C.	H. Bose	0·51	0·19	98·75	0·55
23052	Lake Edward, Victoria Co., N.B.	R. Newton	60·13	8·36	26·31	5·20
23484	Chiticamp, Inverness Co., N.S.	Peardon Bros.	1·765	0·125	93·87	4·23
23485	Cape George, Antigonish Co., N.S.	Peardon Bros.	13·185	3·51	71·625	11·92
23486	Ste. Anne's, Victoria Co., N.S.	Peardon Bros.	3·86	1·09	92·92	2·12
23547	Point Fortune, Que.	Henry Miles	21·15	1·96	49·25	27·64
23744(1)	Strandby, B.C.	John Lockwood	6 33	0·22	98·87	0·57

23744(2)	Strandby, B.C.	John Lockwood	2·03	0·28	97·50	0·20
23847	Tete a Gouche, N.B.	R. Newton	4·82	1·64	81·00	12·53
24146	St. Mary's, Perth Co., Ont.	D. James	5·38	0·725	90·99	2·90
24147	Point Anne, Hastings Co., Ont.	D. James	5·485	0·435	93·745	0·332
24282	Black Cape, P.Q.	J. C. Fair	13·025	0·93	85·152	0·893
24650	Point Anne, Victoria Co., Ont.	W. P. Niles	8·63	0·40	90·23	0·74
25067	Central Caraboo, N.S.	H. A. Barnard	2·85	0·81	94·12	2·22
25142	St. Anne de Chicoutimi, P.Q.	P. Tremblay	53·03	3·89	42·44	0·64
25192	Bartonville, Ont.	J. W. Green and Sons	2·60	1·20	53·87	42·82
25454	International Lime Co., Victoria	P. H. Moore	1·22	0·37	96·75	1·66
25550	St. Louis de France, P.Q.	J. E. Hcon	1·80	0·56	96·68	0·96
25592	Alberni, B.C.	L. A. Smith	62·40	2·30	28·18	.....
25607	Point Fortune, P.Q.	Henry Miles	1·47	1·33	94·06	3·14
25628	Florenceville, Carleton Co., N.B.	J. B. Daggett	30·21	7·70	59·38	2·71
25686	Hartland, Carleton Co., N.B.	J. B. Daggett	5·74	2·91	90·94	0·41
25690	Jacksontown, N.B.	H. B. Durost (Mallory)	69·70	9·02	17·71	3·57
25691	Jacksontown, N.B.	H. B. Durost (Hartt)	18·69	2·03	77·84	1·44
25710	St. Maurice, P.Q.	Rev. Thos. Caron	6·31	1·10	90·55	2·04
25788	Ste. Luce Station, P.Q.	I. St. Laurent	21·38	2·84	72·10	3·68
26119	Haldimand County, Ont.	G. L. Woltz	3·17	0·52	95·81	0·50
26120	Haldimand County, Ont.	G. L. Woltz	7·56	0·48	92·19	.....
26449	Elm Tree, Gloucester County, N.B.	A. D. Doucet	1·08	0·24	98·00	0·68
26450	Elm Tree, Glouchester County, N.B.	A. D. Doucet	2·30	0·30	97·25	0·15
26451	Elm Tree, Clouchester County, N.B.	A. D. Doucet	26·92	1·78	70·00	1·30
26452	Petit Roches Station, N.B.	A. D. Doucet	3·70	0·40	95·00	0·90
26453	Petit Roches Station, N.B.	A. D. Doucet	5·72	1·45	88·75	4·08

Laboratory Nos. 20123-24.—From Merrivale, near Ottawa.

Mechanical Analysis.

	No. 20123. Per cent.	No. 20124. Per cent.
Passes 12-mesh screen	71·6	100·0
" 50 "	15·9	86·2
" 80 "	10·0	69·5

Of the two, No. 20124 is the better, not merely because it is much finer but by reason of its higher percentage of carbonate of lime. No. 20123 would be regarded as o ffair quality; No. 20124, of high grade.

Laboratory No. 20846.—A limestone of good quality from Kirkfield, Victoria county, Ontario.

Mechanical Analysis.

	Per cent.
Passes 12-inch screen	99·7
" 50 "	70·0
" 80 "	65·0

Laboratory No. 20866.—Of good quality and a very satisfactory degree of fineness.

Mechanical Analysis.

	Per cent.
Passes 12-mesh screen	100·
" 50 "	99·
" 80 "	91·

Laboratory No. 20884.—Quarried and ground at Torryburn (near St. John), N.B. Limestone of high grade; fairly satisfactory as to fineness.

Mechanical Analysis.

	Per cent.
Passes 12-mesh screen	99·00
" 50 "	54·0
" 80 "	33·0

Laboratory No. 20894.—From Hensall, Ont. Of fair quality, but rather coarse for prompt action.

Mechanical Analysis.

	Per cent.
Passes 12-mesh screen	89·0
" 50 "	32·0
" 80 "	22·0

Laboratory Nos. 20919 and 20919A.—Crystalline limestone of fair quality, from Morin Heights, Quebec. Sample 20919A from the same location consisted of disintegrated limestone rock, in the condition or form of a coarse gravel; in composition it is somewhat similar to the parent rock, 20919.

Laboratory No. 21029.—From Kirkfield, Ont. An excellent sample both as to carbonate of lime content and degree of fineness.

Mechanical Analysis.

	Per cent.
Passes 12-mesh screen	100·00
" 50 "	98·00
" 80 "	83·00

Laboratory Nos. 21141-21147.—Samples of limestone rock from various localities in New Brunswick, and forwarded by the agricultural authorities of that province. Their relative value for the manufacture of crushed limestone is indicated by the carbonate of limestone content. It will be observed only one sample in the series (No. 21147) could be regarded as distinctly poor.

Laboratory No. 21180.—From Marble Mountain, Cape Breton. Not of the highest grade, but could be used as a source of crushed limestone for local consumption.

Laboratory No. 22014.—An excellent limestone from Kirkfield, Ont., containing 86 per cent carbonate of lime.

Laboratory No. 22019.—Found at a depth of 45 feet at Ebor, Man., of rather poor quality.

Laboratory No. 22402.—From Windsor, N.S. This is a limestone of excellent quality, but is not sufficiently fine if an immediate effect is desired.

Mechanical Analysis.

	Per cent.
Passes 12-mesh screen	85·3
" 50 "	26·0
" 80 "	20·0

Laboratory Nos. 22406-22409.—From localities in New Brunswick at which the provincial agricultural authorities were about to prepare crushed limestone. The data indicate, in all four instances, an excellent grade of limestone.

Laboratory No. 22420.—Sent by Department of Agriculture, New Brunswick. An excellent quality of limestone and well ground.

Mechanical Analysis.

	Per cent.
Passes 12-mesh screen	96·2
" 50 "	55·7
" 80 "	47·3

Laboratory Nos. 22583-22584.—Two samples of limestone from Taylor village, N.B., and forwarded by the Department of Agriculture, New Brunswick. They are both of excellent quality.

Laboratory No. 22822.—A sample of disintegrated limestone rock from near Chaffey's Locks, Ont., of high grade.

Laboratory No. 23035.—From Surrey Centre, B.C. Almost pure carbonate of lime, and therefore of the highest grade.

Laboratory No. 23052.—From Lake Edward, Victoria county, New Brunswick, and forwarded by the Department of Agriculture of New Brunswick. It is an exceedingly low-grade rock, and could not be economically used as a source of ground limestone.

Laboratory Nos. 23484-5-6.—All three samples from quarries in Nova Scotia about to be worked for crushed limestone. Nos. 23484 and 23486 are excellent, and practically of equal value. No. 23485 is decidedly inferior, by reason of its higher percentage of insoluble matter and carbonate of magnesia.

Laboratory No. 23547.—From quarry at Point Fortune, Que. This is not a suitable limestone for agricultural purposes by reason of its high percentages of insoluble rock matter and carbonate of magnesia.

Laboratory No. 23744.—Two samples of limestone rock from Strandby, Vancouver Island, British Columbia, both of which are of excellent quality.

Laboratory No. 23847.—From a quarry at South Tête à Gauche, Gloucester, N.B., and sent by Department of Agriculture, New Brunswick; though somewhat dolomitic it may be considered of good quality for agricultural purposes.

Laboratory Nos. 24146-7.—From Perth and Hastings counties, respectively. Both are high grade limestones.

Laboratory No. 24282.—From Black Cape, Que. Though not of the highest grade, it is of excellent quality.

Laboratory No. 24650.—From Point Anne quarries, near Belleville, Ont. A high grade limestone.

Mechanical Analysis.

	Per cent.
Passes 12-mesh screen	98·0
" 50 "	97·0
" 80 "	94·0

Laboratory No. 25067.—From Cariboo Harbour, N.S. Limestone of excellent quality.

Laboratory No. 25142.—From Ste. Anne de Chicoutimi, Que. A limestone of very poor quality and probably not sufficiently rich in carbonate of lime to pay for crushing.

Laboratory No. 25192.—From Bartonville, Ont. This is a dolomitic limestone with a large percentage of carbonate of magnesia. It is not a desirable limestone for agricultural purposes.

Laboratory No. 25454.—Ground limestone, the product of the International Lime Co., Victoria, B.C. A limestone of excellent quality and quite satisfactory as to degree of fineness.

Mechanical Analysis.

	Per cent.
Passes 12-mesh screen	95·0
" 50 "	44·0
" 80 "	37·0

Laboratory No. 25550.—From St. Louis de France, Que. A high grade limestone and eminently suitable for agricultural purposes.

Laboratory No. 25592.—From Alberni, B.C. A soft micaceous rock containing crystals of iron pyrites. Too low a percentage of carbonate of lime to be of value for agricultural purposes.

Laboratory No. 25607.—From a quarry near Point Fortune, Que. A limestone of excellent quality and suitable for either burning or crushing.

Laboratory Nos. 25628 and 25686.—From Florenceville, Carleton county, New Brunswick, and Hartland, Carleton county, New Brunswick, respectively: sent by the Agricultural Department, New Brunswick. The former is of inferior grade and too poor in carbonate of lime for agricultural use: the latter is a limestone of excellent quality.

Laboratory Nos. 25690-1-2.—Forwarded by the Department of Agriculture, New Brunswick, from Jacksonville, and (No. 25691) Florenceville, New Brunswick. No. 25690 is of very poor quality; the other two are of fair quality only but could be used for agricultural purposes.

Laboratory No. 25710.—From St. Maurice, Que. A limestone of excellent quality.

Laboratory No. 25788.—From St. Luce Station, Quebec, of fair quality only but could be employed for local use.

Laboratory No. 26119-20.—From Cayuga, Haldimand county, Ontario. Both are excellent samples of limestone, quite suitable for agricultural purposes.

Laboratory Nos. 26449-50-51-52-53.—Forwarded by the Department of Agriculture, New Brunswick. Nos. 26449-50, from Elm Tree, Gloucester county, are of excellent quality; No. 26451, also from Elm Tree is of distinctly poor quality; Nos. 26452-3,

from Petite Roche Station: the former is a high grade limestone, the latter not quite so pure, but of excellent quality.

This series comprises fifty-eight samples of limestone, of which thirty-four are reported of excellent quality. Five are from Nova Scotia, twelve from New Brunswick, four from Quebec, nine from Ontario, and four from British Columbia.

MARL.

Marl, also known as shell-marl, is a naturally-occurring carbonate of lime, which, owing to its generally soft and friable nature when air-dried can be readily prepared and easily and uniformly applied to the land. It constitutes a most useful and effective form of carbonate of lime for agricultural purposes, one that frequently can be obtained at the cost of digging and hauling from a deposit on the farm or in the neighbourhood.

Marl is found in many parts of Canada, occurring as a deposit, varying in thickness from a few inches to several feet, on old lake bottoms. It is frequently overlaid by muck—a material also valuable as a soil amendment, and more especially for loams deficient in organic matter. In composition, many deposits of marl are almost pure carbonate of lime, but others, of less value, contain variable amounts of clay, sand, organic matter, etc.

In the following table we present the analytical data and other information from the examination of a number of marls sent in during the past year:—

Lab. No.	Locality.	Sender.	Mineral matter insoluble in acid.	Oxide of Iron and Alumina (Fe^2O^3+ Al^2O^3).	Carbonate of Lime. ($CaCO^3$).	Carbonate of Magnesia ($MgCO^3$).	Moisture, organic matter, etc., undetermined.	Remarks.
			p.c.	p.c.	p.c.	p.c.	p.c.	
20436	Richmond, P.E.I	X. O. Gallant	39·57	3·23	50·37	.....	6·83	Marl of poor quality, but could be used locally.
20831	Mabou Harbour, N.S.	D. F. Mcdonald	13·78	2·61	75·51	.....	8·10	Not of first quality, but useful amendment.
20901	Mirror Lake, B.C.	A. T. Davis	3·45	0·67	89·48	0·14	6·26	A marl of good quality; a valuable deposit.
21025	"White Lake Property," Kingston	G. M. Macdonnell	2·52	0·58	90·19	1·14	5·57	A marl of good quality; a valuable deposit.
22324	Mirror Lake, B.C.	A. T. Davis	0·20	1·25	98·00	.....	0·55	Of excellent quality, almost pure carbonate of lime.
22816	Phelpston, Ont.	W. J. Galbraith	6·10	1·48	87·58	2·16	2·68	An excellent grade of high purity.
23036	Surrey Centre, B.C.	H. Bose	5·53	0·50	86·50	1·73	5·74	A marl of very good quality.
23107	Kettle Valley, B.C.	Lt.-Col. W. H. Glossop.	5·31	1·66	89·36	3·74	.....	Of excellent quality.
23110	Ste. Adelaide de Pabos, Que.	David Duguay	2·29	0·89	94·11	2·24	0·47	Excellent quality high grade.
23893	Black Cape, Que.	J. C. Fair	34·35	7·32	46·25	2·31	9·77	Of decidedly poor quality.
24465	Flesherton, Ont.	Chas. Buchanan	1·39	0·41	94·75	2·09	1·36	Of excellent quality.
24466	Flesherton, Ont.	Chas. Buchanan	3·25	0·43	90·23	1·93	4·16	Of excellent quality.
24467	Flesherton, Ont.	Chas. Buchanan	1·46	0·40	93·87	1·62	2·65	Of excellent quality.
25060	New Denver, B.C.	C. W. Nelson	0·42	0·14	93·44	2·35	3·65	Of excellent quality.
25216	Robitaille, P.Q.	Pierre Cyr	26·93	3·98	62·13	4·27	2·69	Of rather poor quality.
25631	Papineauville, P.Q.	T. Bonhomme	6·64	1·93	85·50	1·93	4·00	Of good quality.
26106	St. Adelaide de Pabos, P.Q.	Rev. V. Cote, P.P	0·89	0·20	91·59	.....	7·32	Of excellent quality.
26116	Mabou Coal Mines, N.S.	Donald McDonald	37·68	5·58	54·89	.....	1·85	Of rather poor quality.
26117	Mabou Coal Mines, N.S.	Donald McDonald	9·43	2·62	86·83	.....	1·12	Fairly rich in carbonate of lime.
26124	Vernon, B.C.	J. L. Cull	17·86	1·63	66·37	1·10	13·04	Not of high quality; could be used locally.
26125	Vernon, B.C.	J. L. Cull	92·63	1·89	trace	.....	.....	Worthless for agricultural purposes.
26188	Malakwa, B.C.	H. M. Humphrey	3 15	1·50	93·31	.....	2·04	Of excellent quality.
26354	Spa Springs, N.S.	Frank Bolser	72·53	17·20	trace	.....	.....	Has no agricultural value.

The distribution of these samples according to provinces is as follows: Nova Scotia, four; Prince Edward Island, one; Quebec, five; Ontario, five; British Columbia, eight. Of these, eight contained over 90 per cent carbonate of lime, and six between 80 and 90 per cent.

FERTILIME.

This is the trade name of a product of the International Lime Company of Sumas, Washington State, U.S.A., and which has had a considerable sale in British Columbia. It is stated to be a "combination of ground limestone and hydrated lime in the proportions of 10 per cent of the former to 90 per cent of the latter."

Its analysis of a sample (laboratory No. 20945) afforded the following data:—

Carbonate of lime	13·95
Slaked lime (hydrated lime)	79·22
Carbonate of magnesia	0·63
Oxide of iron and alumina	0·51
Mineral matter insoluble in acid	3·68
Undetermined	2·01
	100·00

Mechanical Analysis.

	Per cent.
Passes 12-mesh screen	96·5
" 50 "	94·0
" 80 "	85·0

These results indicate a lime amendment of high calcium efficiency, both as to composition and degree of fineness.

LIME-KILN REFUSE.

Laboratory No. 23039.—Forwarded from kiln near North Tyrone, P.E.I. Of a reddish-brown colour, showing the effect of calcination, and containing a considerable percentage of quartz. Its partial analysis afforded the following results:—

	Per cent.
Mineral matter insoluble in acid	66·59
Oxide of iron and alumina	7·87
Lime*	9·69
Phosphoric acid	nil.
Potash	·07

*Equivalent to 17·32 per cent carbonate of lime.

As a material for furnishing lime this is of very poor quality. Phosphoric acid is absent and potash is present in traces only, showing that there is no wood ash present.

LIME REFUSE.

These four samples, presumably the refuse of lime kilns, were forwarded from the Experimental Station at Fredericton, N.B., for information as to their comparative values.

Laboratory No. 25712—Stetson and Cutler.
25713—Purdy and Green.
25714—Randolph and Baker.
25715—Miller.

Their analyses afforded the following data:—

	Laboratory No.			
	25712	25713	25714	25715
	p. c.	p. c.	p. c.	p. c.
Mineral matter insoluble in acid	3·10	·49	1·52	·88
Oxide of iron and alumina	7·15	·38	1·61	1·06
Lime (CaO)	69·76	94·02	47·91	64·26
Magnesia	2·77	1·66	30·51	1·15

Nos. 25712 and 25713 contained a small percentage of lime in the form of carbonate, No. 25714 a notable amount as carbonate, and No. 25715 a still larger percentage as carbonate.

No. 25713 is the best sample of the series, being the richest in lime. Nos. 25712 and 25715 are very similar as to composition and of very fair quality. No. 25714 is from a magnesian limestone and of inferior quality for agricultural purposes.

CALCAREOUS DEPOSIT.

Laboratory No. 20131.—This deposit occurs on the banks of a river at the foot of a mountain at Canal Flats, Kootenay, B.C., and has a thickness at the outcrop of 15 feet.

As received it was a white pasty material, drying on exposure to the air to an extremely hard whitish mass. Under the microscope it shows quartz particles cemented in a matrix of lime and magnesia carbonate.

Its analysis showed it to have the following composition in the air-dried condition:—

Mineral matter insoluble in acid	53·14
Oxide of iron and alumina	5·40
Carbonate of lime	23·45
" magnesia	16·27
Undetermined	1·74
	100·00

This deposit, if dried and ground, would have a considerable value as an amendment for soils in need of lime. Applied in the wet, pasty condition it might, on certain soils, have a cementing effect, injuring their tilth.

DEPOSIT FROM BOTTOM OF LAKE.

Laboratory No. 24096.—This from a lake near Fairview, B.C., the water of which is said to be dangerous, indeed fatal, to stock. As received, it was in the form of light, yellowish grey lumps of a porous character, with a general appearance not unlike that of marl.

The analysis of the air-dried material afforded the following data:—

Moisture	5·81
Mineral matter insoluble in acid	15·36
Oxide of iron and alumina	0·98
Lime[1] CaO	35·20
Magnesia[2] MgO	5·12
Sulphates[3] SO_3	1·57
Carbonic acid, etc	35·96
	100·00

(1) Equivalent to carbonate of lime	62·99
(2) " " magnesia	10·75
(3) " sulphate of soda	1·53

The mineral matter insoluble in acid was found to consist essentially of diatoms.

Phosphates are absent, and traces only of chlorine are present.

A further examination was made by extracting the air-dried mass with cold water, filtering and submitting the filtrate to analysis, obtaining the following results:—

	Per cent.
Carbonate of lime	0·43
" magnesia	0·15
Sulphate of magnesia	0·29
" soda	1·78
	2·65

This deposit might be termed a diatomaceous marl, containing a small amount of sulphate of soda (soluble) which imparts a bitterish taste to the material.

We presume that the water of the lake from which this material was procured, is more or less seriously impregnated with sulphate of soda (Glauber's salts) and it is the presence of this material that tenders the water purgative and dangerous to stock. Probably sulphate of magnesia, another purgative compound, is also present to some degree. As these two compounds are extremely soluble they would not ordinarily be deposited in any quantity when the marl formed on the bottom of the lake, and hence the small percentages found by our analysis in the deposit.

WOOD ASHES: TAN BARK ASHES.

Laboratory Nos. 25265-6.—From Bathurst West, N.B., our correspondent writes: "No. 1 are from the kitchen stove in which mixed wood is burnt, No. 2 are from the local saw-mills where the burned refuse and the ashes are exposed for a year before being applied to the land." Their analyses afforded the following data:—

	No. 1.	No. 2.
	p.c.	p.c.
Water	1·01	17·40
Loss on ignition (charcoal, etc.)	18·80	17·01
Mineral matter insoluble in acid	5·67	20·81
Oxide of iron and alumina	4·85	3·93
Lime (present chiefly as carbonate)	36·82	16·06
Potash	2·70	1·42
Phosphoric acid	3·45	1·05

No. 1: Stove ashes. This sample is much the superior owing to its higher percentage of potash and phosphoric acid and of lime. It is not, however, equal in potash content to average unleached wood ashes.

No. 2: The data indicate a low fertilizing value, evidently there is present a considerable admixture of sand, etc., and that the ashes have been severely leached.

Laboratory No. 25889.—From Millerton, N.B., and stated to be from a furnace burning spent tan bark (hemlock), with a certain amount of slack coal.

These ashes, as received, consisted largely of a fine brownish red powder mixed with coarser black material, which is partly cinders and partly charcoal. Their composition is as follows:—

Water	14·56
Mineral matter soluble in acid	41·87
" " insoluble in acid	33·12
Loss on ignition (charcoal, etc.)	10·45
	100·00

	Per cent.
Lime (partly as carbonate)	16·40
Oxide of iron and alumina	13·83
Potash	0·54
Phosphoric acid	0·58

Though possessing some fertilizing value, especially for soils in need of lime, these ashes are distinctly inferior to wood ashes, which, on an average, would contain, if unleached, from 5 per cent to 6 per cent potash and about 2 per cent phosphoric acid.

Laboratory No. 25910.—Also from Millerton, N.B., from hemlock bark extract factory, the fuel being 200 pounds coal and 2,000 pounds of spent tan bark. The composition, as indicated by analysis is as follows:—

Water	0·15
Mineral matter soluble in acid	53·86
Mineral matter insoluble in acid	42·77
Loss on ignition (charcoal, etc.)	3·22
	100·00

	Per cent.
Lime (partly as carbonate)	17·46
Oxide of iron and alumina	20·45
Potash	0·67
Phosphoric acid	0·70

These ashes are slightly richer in potash, phosphoric acid, and lime than the preceding sample (No. 25889), but they are not comparable to good wood ashes. As already indicated, they could best be used as an amendment for soils in need of lime, the small percentage of potash and phosphate acid, however, giving an additional value for soils deficient in these elements, such as light sandy and muck loams.

Laboratory No. 26370.—Wood ashes forwarded from Burford, Ont. This sample on analysis afforded the following data:—

Water	1·10
Loss on ignition (charcoal, etc.)	1·48
Mineral matter insoluble in acid	59·45
Oxide of iron and alumina	6·35
Lime (chiefly as carbonate)	14·56
Potash	1·20
Phosphoric acid	0·66

This is a distinctly inferior grade of wood ashes, containing a large admixture of sand and other inert matter, with very small percentages of potash and phosphoric acid. It is rather of the nature of an amendment than a fertilizer.

Laboratory No. 26386.—This sample, also from Burford, Ont., afforded, on analysis, the following data:—

	Per cent.
Water	0·89
Loss on ignition (charcoal, etc.)	1·24
Mineral matter insoluble in acid	66·61
Potash	1·34

This, like the preceding sample, is of inferior quality, the percentage of inert matter (sand, etc.) being very high and the potash content much below that of good unleached wood ashes.

STONEMEAL.

Laboratory No. 25383.—Stonemeal is the trade name of a product put out by the Stonemeal Fertilizer Company of North Patterson, N.J. The sample here reported on was forwarded by a correspondent in Pembroke, Ont., to whom it had been offered as a fertilizer for "general purposes".

In our report of last year we fully discussed the nature of this product and the reader is referred to that account (report of Dominion Chemist ending March 31, 1915, page 123). However, as apparently there is an effort to introduce this material

into Canada it may be well to repeat the essential features of our previous report and thus renew the warning against accepting this product as one likely to give a profitable response or one in any degree comparable to our ordinary commercial fertilizers.

The analysis of the present sample differs but little from that of No. 18230, examined last year.

	No. 18230.	No. 25383.
	p.c.	p.c.
Mineral matter insoluble in acid	44·42	46·95
Lime, present as carbonate, sulphate and phosphate	19·00	21·80
Magnesia	4·43	—
Potash	0·30	0·23
Phosphoric acid	5·55	5·27

It is in the form of a very finely ground grey powder insoluble in water, and is seen, under the microscope, to contain particles of mica, quartz, and feldspar. Apparently it is a mixture of fine ground rock material, including a native phosphate of lime.

This material does not contain any immediately soluble and available plant food, and hence it cannot be classed as a fertilizer.

Its only fertilizing constituent in notable amount is phosphoric acid and this, by reason of its insoluble character, would practically be of no immediate use to crops.

POND MUD.

Laboratory No. 25039.—From Peake Station, P.E.I. Regarding the origin of the mud our correspondent says: "This mud is taken from a bottom of a lake surrounded by a swamp. It is much frequented by wild geese and ducks, especially at night. Years ago, in the days of the early settlers, the water fowl were very abundant, the surface of the water being thickly covered with them. The lake is about 600 acres in extent, one-third of it being very deep, the remainder only about 3 feet deep. It is fed by large springs."

The air-dried sample was submitted to partial analysis with the following results:—

Moisture	8·77
Organic and volatile matter	54·45
Mineral matter soluble in acid	5·56
Mineral matter insoluble in acid	31·22
	100·00

	Per cent.
Nitrogen in organic matter	3·19
Phosphoric acid	0·66
" equivalent to phosphate of lime	1·44

The notable features of this analysis are the large percentages of nitrogen and organic matter, which give the material a very high manurial value. It also contains a notable amount of phosphoric acid. This is probably the richest pond or lake deposit that has come under our notice, and we are inclined to regard it, from the analysis, as well as from the account of its origin, as of the nature of guano, although its plant food constituents may not be so available for plant growth. It would undoubtedly prove of very considerable value for soils deficient in nitrogen and humus.

BONE CHAR.

Laboratory No. 25381.—This is the spent char from the clarification of corn syrup, being the particles of the charred bone which had become too finely divided to be used again. The sample was submitted by a correspondent in Brighton, Ont, and obtained

from the Edwardsburg Starch Company of Cardinal, Ont. Its analysis afforded the following data:—

	Per cent.
Organic matter	25·71
Mineral matter insoluble in acid	·72
Phosphate of lime	66·77
Nitrogen	1·06

The direct application of this material to the soil is scarcely to be advised, as its phosphoric acid is not readily available. Possibly it could be reduced or rendered partially soluble by admixture or composting with actively rotting manure, but we are of the opinion that it could be most economically employed in the manufacture of superphosphate.

COTTON MILL WASTE.

Laboratory No. 22423.—From a cotton mill at St. John, N.B., and stated to contain both seed and leaf. To satisfy inquiries as to the possible fertilizing value of this waste, which could be obtained very cheaply, the following analysis was made:—

	As received.	Air dried.
Water	38·11	4·12
Organic matter	37·55	58·15
Ash	24·34	37·73
	100·00	100·00
	Per cent.	Per cent.
Nitrogen	1·06	1·65
Phosphoric acid	·24	·37
Potash	·69	1·06

The amount of plant food in this waste is not large. Further, this waste would undoubtedly be found strongly resistent to decay in the soil and as a consequence, its plant food would only very slowly be rendered available for crop use. We could not advise, therefore, its direct application to the soil. It reduction by a chemical method, in the preparation of a fertilizer, does not offer much hope of a profitable return, owing to its small percentage of the fertilizing constituents.

STAR-FISH AS A FERTILIZER.

Laboratory Nos. 25002 and 25095.—In order to furnish information to correspondents on the Pacific coast of British Columbia as to the fertilizing value of star-fish, we procured for analysis through the kindness of the Superintendent at the Experimental Station, Sidney, B.C., several specimens.

Laboratory No. 25002.—This sample was received in December, 1915, and consisted of two star-fish that had been collected in the previous July and which had been on the surface of the soil and exposed to air and rain since that time. The specimens as received were dry and, evidently, partly decomposed.

Laboratory No. 25095.—Consisted of three fresh star-fish, in water, collected December 18, 1915:—

Analysis of Dried Star-fish.

	No. 25002.	No. 25095.
	p.c.	p.c.
Moisture	1·21	2·66
Organic matter	27·12	45·47
Carbonate of lime	57·00	40·20
" magnesia	6·40	6·11
Nitrogen, in organic matter	3·05	5·51

Phosphoric acid is present in traces only.

From these results it is seen that the dry star-fish is especially rich in nitrogen (sample No. 25002 had through decomposition and leaching lost a large part of its original nitrogen) and this must be considered as possessing a very considerable fertilizing value. Owing to the ready decomposition of the star-fish in the soil, this nitrogen becomes more or less quickly available for crop use. Of course, the fresh star-fish will contain a large amount of water, probably 80 per cent or over, so that as collected the nitrogen may not be more than 1 per cent, but this, it may be pointed out, is twice the amount present in ordinary farm manure.

There is also present a considerable percentage of carbonate of lime, which would be of value for soils in need of lime.

With respect to the decomposition of star-fish in the soil, the Superintendent at Sidney writes in March, 1916: "I secured and deposited in the soil at a depth of 5 inches, three large star-fish on December 5, 1915. On March 1, I examined these to determine the degree of decay, and am pleased to report that they were very much decomposed. They had reached a state that would permit of their being distributed through the soil particles by ordinary cultivation."

FERTILIZER EXPERIMENTS.

Systematic investigational work with fertilizers was inaugurated by this Division in the spring of 1913, on the Experimental Stations at Fredericton, N.B., and Kentville, N.S.

This work has been greatly extended and now includes similar experimental schemes at branch Experimental Stations at Charlottetown, P.E.I., Cap Rouge, Que., and Agassiz, B.C., reported here for the first time. Provision has also been made at several of the other Stations, as at Nappan, N.S., Lennoxville, Que., and Sidney, B.C., for the institution during the present year (1916) of experimental work with fertilizers. This branch of our work, as regards its immediate supervision, has been placed in the hands of Mr. B. Leslie Emslie, who previous to his appointment on the staff of the Division in September of last year, had had a special experience in the conduct of such investigations. His report on the results obtained in 1915 follows:—

Investigational Work with Fertilizers.

Report of the Supervisor, B. Leslie Emslie, C.D.A., F.C.S.

In presenting this, his first report on Investigational Work with Fertilizers, on the Dominion Experimental Farms, the writer would draw attention to the fact that in the year 1915, in addition to the fertilizer experiments hitherto conducted at a few of the branch Experimental Stations, the new and comprehensive scheme, adopted in 1913, which placed the whole matter on a more systematic basis, has been inaugurated at the following Stations: Agassiz, B.C., Cap Rouge, Que., Charlottetown, P.E.I., Fredericton, N.B., and Kentville, N.S. This year (1916) the investigation is being extended to the Stations at Lennoxville, Que., Nappan, N.S., and Sidney, Vancouver Island.

EXPERIMENT "A".

To ascertain the quantity and proportionate composition of a fertilizer which will yield the greatest profits.

While disclaiming any responsibility or credit for the formulation of this scheme, the writer readily endorsed the breadth of its scope, and believes that, with

certain slight modifications it will prove a valuable index and guide to further research in the science of the soil.

The fertilizer to which the highest yield is attributed may not prove the most profitable, if the value of the additional increase fails to repay the extra quality or cost of the fertilizer used.

Having in view the fact that fertilizers exert an influence on crop production beyond the year of their applications, the yields from the plots will be computed throughout a three-year rotation consisting of: first year, potatoes (or other hoed crop); second year, grain; third year, hay.

Table No. I shows the plan of the experiment. It will be noted that the plots Nos. I to VI receive fertilizers at one rate only, per acre, whereas Nos. VII to XVIII are fertilized at three rates per acre, plots B and C in each series receiving, as a rule, three-fourths and one-half, respectively, the quantity of the mixture applied to plot A.

Plots A, B, C, at the end of the series, in addition to full and half quantities of manure, receive the same fertilizers, both in quality and amount, as applied to plot XVII B. In the second and third years of the rotation, plots B and D receive 175 pounds of this fertilizer mixture. Plots E and F are manured at the rates of 15 and 7½ tons per acre, respectively, in the first year of the rotation, but receive no fertilizer. Check plots, the average yields of which are shown in the tabulated plan, are at intervals throughout the experimental area.

A closer inspection of the table will show that to plots Nos. I to VI, nitrogen, phosphoric acid, and potash are applied singly and in combinations of two, while to the remainder of the plots these ingredients are applied in varying quantities and proportions of these three elements.

By reference to the headings of the table we find that, throughout the plan, two sources each of nitrogen and phosphoric acid are used, while the potash is derived solely from muriate of potash. Thus one-half the nitrogen is supplied in the form of nitrate of soda, and the other by a corresponding quantity of sulphate of ammonia. Likewise equivalent quantities of acid phosphate and basic slag are used to supply the phosphoric acid.

The columns on the right hand side of the table contain the percentages of nitrogen, phosphoric acid, and potash present in each mixture.

Reason for the Apparent Lack of Symmetry in the Percentages.

In explanation of the apparent lack of symmetry in the figures representing the percentages of nitrogen, phosphoric acid, and potash, it may be stated that the fertilizing plan was based on a mathematical diagram in which, for the sake of greater uniformity, the plant food ingredients were referred to in terms of their elements, viz., nitrogen, phosphorus and potassium. It will be noted that the maximum applications of nitrogen and phosphoric acid represent, respectively, the equivalents of 800 pounds of nitrate of soda and 1714 pounds of acid phosphate, per acre, whereas the maximum applications of potash represents the equivalent of only 225 pounds of muriate of potash, per acre. Now, the maximum quantities of nitrogen and phosphoric acid are each four times as large as what might be considered normal applications of these materials whereas the maximum potash applications may not be greatly in excess of the normal requirements of a potato crop for that fertilizer constituent.

However, in view of the wide range of the plan, this, if a defect, is not a serious one, but a slight readjustment—which we contemplate—might permit of the advantageous curtailment of the plan and a reduction in the number of plots.

Nature of the Soils on which the Experiments are being conducted.

Agassiz: Sandy loam.

Cap Rouge: Clay loam with shale subsoil.

Charlottetown: Light loam.

Fredericton: Medium loam with clay subsoil.

Kentville: Light sandy loam with sand subsoil.

Preparatory to the commencement of these experiments, the areas were cropped and a record obtained of the normal production capacity of each plot. In computing the profits from the fertilizers at the end of the rotation, these records will be taken into consideration.

In table No. II the results from the first year of the experiment are given. At four Stations potatoes and at one (Agassiz) mangels was the crop grown. In column No. 10 the averages of the potato yields are stated.

In order that the fertilizer applications may be studied in conjunction with the yields, the former are given in columns 2, 3, 4 of the table, but to preserve a simplicity and to economize space, are stated in terms of nitrate of soda, acid phosphate, and muriate of potash only.

Disturbing Factors.

The experimenter with fertilizers must be prepared to encounter many conflicting results the cause of which it is difficult and often impossible to discover. Inequalities of soil frequently prove a disturbing factor, and one which, no doubt, our present investigations may not be entirely free from.

At present no reason can be given for the fact that at Cap Rouge, plot I (receiving nitrogen alone) produced the highest yield. Possibly at a later stage of the investigation some light may be thrown on the phenomenon.

Discussion of the Results.

Any attempt to draw definite conclusions from the first year's results would be a procedure contrary to the purpose of the experiment, but we may, nevertheless, make some deductions, particularly from the averages of the potato yields.

By resorting to the study of averages, many irregularities are overcome, although averages may not be taken as absolutely reliable when the conditions of soil and climate are variable.

Averages of Potato Yields.

Plot A occupies the first place. This plot received manure at the rate of 15 tons per acre in addition to the same fertilizer as was applied to plot XVII B. Plot A produced the largest yield at Kentville, was fifth at Cap Rouge, sixth at Fredericton, and thirty-first at Charlottetown. With respect to the latter it should be stated that, owing to a misunderstanding, the manure was not applied to plots A, B, C, D, E, F until after potatoes had been planted. In consequence the yields from these plots at

Charlottetown were depressed, and they have not been included in the averages which, for the manured plots, were computed from the yields obtained at Cap Rouge, Fredericton, and Kentville.

Plot IX A, which received the heaviest application of phosphoric acid (equal to 1,714 pounds of acid phosphate, per acre) together with the equivalent of 266 pounds of nitrate of soda and 100 pounds of muriate of potash, produced the largest yield at both Fredericton and Charlottetown, was sixth at Cap Rouge, eighth at Kentville, and stands second in the list of averages.

Plot VIII A, which occupies third place in the column of averages, stood, in point of yield, second at Charlottetown, third at Kentville, and fourth at both Cap Rouge and Fredericton. This plot received the third largest application of phosphoric acid (equal to 1,142 pounds of acid phosphate, per acre) the second largest application of nitrogen (equal to 532 pounds of nitrate of soda, per acre) together with 100 pounds of muriate of potash. Plots B and D, occupying fourth and fifth places in the averages ranked, respectively, second and fourth at Kentville. These plots received manure in addition to fertilizer mixture XVII B at the rate of 15 tons per acre on plot B, and 7½ tons per acre on plot D.

Plot VIII B, sixth in the column of averages, received three-fourths the quantity of the same fertilizer mixture as was applied to plot VIII A. This plot stands seventh at Kentville, eighth at Fredericton, ninth at Charlottetown, and tenth at Cap Rouge.

Plot VII A, seventh in the column of averages, received the heaviest applications of nitrogen (equal to 800 pounds of nitrate of soda, per acre) together with the equivalents of 572 pounds of acid phosphate and 100 pounds of muriate of potash. This plot occupied third place at both Cap Rouge and Fredericton, eleventh place at Kentville, and eighteenth at Charlottetown.

Closely following plot VII A comes plot X A, the fertilizer of which corresponds to 160 pounds of nitrate of soda, 686 pounds of acid phosphate, and 120 pounds of muriate of potash, per acre.

Twelfth in the column of average yields stands plot XI A which received the heaviest application of potash (225 pounds of muriate of potash per acre) together with the equivalent of 200 pounds of nitrate of soda and 428 pounds of acid phosphate. This plot is second, in point of yield, at Fredericton, thirteenth at Charlottetown, twenty-fifth at Kentville and twenty-eighth at Cap Rouge.

In view of the large yields which attended the application at certain Stations of the maximum quantities of nitrogen and phosphoric acid, on plots VII and IX A, respectively, we are led to inquire whether heavier applications of these might not have been profitably employed in conjunction with the maximum potash-application.

It is a noteworthy fact that throughout the column of average yields the plots A, B, and C of each series follow each other in that order. In no single instance does the yield from a B plot exceed the yield from the A plot nor the yield from a C plot exceed the yield from the B plot of the same series. This regularity in the averages is significant, indicating, as it does, a great degree of consistency in the results.

Having studied the potato yields thus far, we may permit ourselves to examine, in a tentative way, the profits or losses attending the application of the fertilizers to the first crop of the rotation without prejudice to the final estimates to be made at the completion of the rotation.

A Tentative Calculation of Profit and Loss based on the First Year's Results in Experiment "A."

The cost of the fertilizers has been estimated on a fair normal basis, valuing nitrate of soda at $3, acid phosphate at $1, and muriate of potash at $2.50, per 100 pounds.

The value of the manure (or rather of its influence in the first year) applied to plots A, B, C, D, E, F is placed at $1 per ton.

For the purpose of the present calculation we have valued the potato crop at 50 cents per bushel and mangels at 14 cents per bushel.

By deducting the average yield of the check plots, at each Station, from the yield of the fertilized plots, we find the increase due to the fertilizing; then by deducting the cost of the fertilizer used from the value of the increase we find the profit (or loss) in each instance. It must be remembered that many of the losses recorded may be converted into profits when the total values of the increases are compiled at the close of the three-year rotation, although undoubtedly the fertilizer mixtures which in the first year have shown a substantial profit from their use are those likely to maintain their lead.

TABLE I.—Fertilizer Applications in Experiment "A."

Plot.	Nitrogen (N).			Phosphoric acid (P^2O^5).			Potash (K^2O).		Total weight of mixture.		Percentage composition of fertilizer mixture.		
	Nitrogen	Nitrate of Soda (15% N.).	Sulphate of Ammonia. (20% N.).	Phosphoric Acid.	Acid Phosphate (16% P^2O^5).	Basic Slag (16% P^2O^5).	Potash.	Muriate of Potash (50% K^2O)	Lbs. per acre.	Lbs. per plot of 1-40th acre.	Nitrogen (N.).	Phosphoric Acid (P^2O^5).	Potash (K^2O).
	Lbs. per acre.	Lbs. per acre.	Lbs. per acre.	Lbs. per acre.	Lbs. per acre.	Lbs. per acre.	Lbs. per acre.	Lbs. per acre.					
I	30·0	100·0	75·0	.....	.....	.....	.....	.....	175·0	4·4	17·0	.....	.....
II	40·0	133·0	100·0	91·5	286·0	286·0	.....	.....	805·0	20·13	5·0	11·4	.....
III	.....	.....	.....	114·0	357·0	357·0	.....	.....	714·0	17·85	.....	16·0	.....
IV	.....	.....	.....	114·0	357·0	357·0	62·5	125·0	839·0	20·0	.....	13·6	7·4
V	.....	.....	.....	.....	.....	.....	75·0	150·0	150·0	3·75	.....	.....	50·0
VI	50·0	166·0	125·0	.....	.....	.....	62·5	125·0	416·0	10·4	12·0	.....	15·0
VII A	120·0	400·0	300·0	91·5	286·0	286·0	50·0	100·0	1,372·0	34·3	8·7	6·7	3·6
B	90·0	300·0	225·0	68·5	214·0	214·0	37·5	75·0	1,028·0	25·7	8·7	6·7	3·6
C	60·0	200·0	150·0	45·8	143·0	143·0	25·0	50·0	686·0	17·2	8·7	6·7	3·6
VIII A	80·0	266·0	200·0	183·0	572·0	572·0	50·0	100·0	1,710·0	42·75	4·7	10·7	3·0
B	60·0	200·0	150·0	137·0	428·0	428·0	37·5	75·0	1,281·0	32·0	4·7	10·7	3·0
C	40·0	133·0	100·0	91·5	286·0	286·0	25·0	50·0	855·0	21·37	4·7	10·7	3·0
IX A	40·0	133·0	100·0	274·0	857·0	857·0	50·0	100·0	2,047·0	51·2	2·4	13·4	2·4
B	30·0	100·0	75·0	206·0	643·0	643·0	37·5	75·0	1,536·0	38·4	2·4	13·4	2·4
C	20·0	66·5	50·0	137·0	428·0	428·0	25·0	50·0	1,022·5	25·6	2·4	13·4	2·4
X A	24·0	80·0	60·0	110·0	343·0	343·0	60·0	120·0	946·0	23·65	2·5	11·6	6·3
B	17·0	57·0	43·0	78·0	243·0	243·0	42·5	85·0	671·0	16·77	2·5	11·6	6·3
C	10·0	33·3	25·0	46·0	143·0	143·0	25·0	50·0	394·3	9·86	2·5	11·6	6·3
XI A	30·0	100·0	75·0	68·5	214·0	214·0	112·5	225·0	828·0	20·7	3·6	8·3	13·6
B	22·5	75·0	56·25	51·4	160·5	160·5	84·5	169·0	621·25	15·53	3·6	8·3	13·6
C	15·0	50·0	37·5	34·25	107·0	107·0	56·25	112·5	414·0	10·35	3·6	8·3	13·6
XII A	60·0	200·0	150·0	68·5	214·0	214·0	75·0	150·0	928·0	23·2	6·5	7·4	8·0
B	40·0	133·0	100·0	45·4	142·0	142·0	20·0	100·0	617·0	15·43	6·5	7·4	8·0
C	20·0	67·0	50·0	22·7	71·0	71·0	25·0	50·0	309·0	7·7	6·5	7·4	8·0

XIII	A	53·32	177·0	133·0	91·5	286·0	286·0	50·0	100 0	882·0	24·55	5·4	9·3	5·0
	B	40·0	133·0	100·0	68·5	214·0	214·0	37·5	75·0	736·0	18·40	5·4	9·3	5·0
	C	26·66	89·0	67·0	45·8	143·0	143·0	25·0	50·0	492·2	12·30	5·4	9·3	5·0
XIV	A	40·0	133·0	100·0	123·5	386·0	386·0	50·0	100·0	1,105·0	27·6	3·6	11·0	4·5
	B	30·0	100·0	75·0	91·5	286·0	286·0	37·5	75·0	822·0	20·55	3·6	11·0	4·5
	C	20·0	66·5	50·0	59·5	186·0	186·0	25·0	50·0	538·5	13·5	3·6	11·0	4·5
XV	A	30·0	100·0	75·0	68·5	214·0	214·0	50·0	100·0	703·0	17·6	4·3	9·7	7·0
	B	22·5	75·0	56·25	51·4	160·5	160·5	37·5	75·0	527·25	13·2	4·3	9·7	7·0
	C	15·0	50·0	37·5	34·25	107·0	107·0	25·0	50·0	351·5	8·8	4·3	9·7	7·0
XVI	A	40·0	133·0	100·0	91·5	286·0	286·0	50·0	100·0	905·0	22·6	4·4	10·0	5·5
	B	30·0	100·0	75·0	68·5	214·0	214·0	37·5	75·0	678·0	17·0	4·4	10·0	5·5
	B	20·0	65·5	50·0	45·8	243·0	143·0	25·0	50·0	452·5	11·3	4·4	10·0	5·0
XVII	A	30·0	100·0	75·0	68·5	214·0	214·0	75·0	150·0	753·0	18·8	4·0	9·0	10·0
	B	22·0	75·0	56·25	51·4	160·5	160·5	56·5	112·5	564·75	14·1	4·0	9·0	10·0
	C	15·0	50·0	37·5	34·25	107·0	107·0	37·5	75·0	376·5	9·4	4·0	9·0	10·0
XVIII	A	40·0	133·0	100·0	183·0	572·0	572·0	100·0	100·0	1,177·0	37·0	2·7	12·4	3·4
	B	30·0	100·0	75·0	137·0	428·0	428·0	37·5	75·0	1,106·0	27·65	2·7	12·4	3·4
	C	20·0	66·5	50·0	91·5	286·0	286·0	25·0	50·0	738·5	27·65	2·7	12·4	3·4

Plot "A" mixture XVII B.—15 tons manure—nothing in second and third years.
"B" mixture XVII B.—15 tons manure—175 pounds XVII B. second and third years.
"C" mixture XVII B.—7½ tons manure—nothing in second and third years.
"D" mixture XVII B.—7½ tons manure—175 pounds XVII B in second and third years.
"E" 15 tons manure alone.
"F" 7½ tons manure alone.
"G" Check plot.
"H" Check plot.
"I" Check plot.

TABLE No. II.—Experiment "A" 1915. Results from the First Crop of the Rotation.

Plot. No.	Fertilizing per acre.			Total Yields per acre (in bushels).					
	Nitrate of Soda[1]	Acid Phosphate[2]	Muriate of Potash.	Mangels. Agassiz.	Potatoes Cap Rouge.	Potatoes Charlottetown	Potatoes Fredericton	Potatoes Kentville.	Averages of Potato Yields.
I	200	.....	.....	73·33	217·33*	69·2	166·3	97·0	110·85
II	266	572	.....	450·0	126·0	71·20	231·8	134·0	140·75
III	.....	714	.....	393·33	84·67	76·38	186·4	67·67	103·75
IV	.....	714	125·0	433·33	83·33	84·84	235·9	94·0	124·27
V	.....	.....	150·0	53·33	54·0	77·33	192·8	81·67	101·45
VI	332	.....	125·0	228·66	75·33	55·33	177·0	136·67	111·08
VIIA	800	572	100·0	566·66	158·0	71·13	291·7	143·67	160·45
VIIB	600	428	75·0	566·66	160·0	83·75	222·4	136·67	150·70
VIIC	400	286	50·0	343·33	94·0	45·33	215·8	94·0	112·28
VIIIA	532	1,142	100·0	610·0	154·66	120·67	275·0	172·0	180·41
VIIIB	400	856	75·0	676·66	118·67	96·5	263·0	160·0	161·35
VIIIC	266	571	50·0	390·0	100·0	70·92	183·4	107·0	115·33
IXA	266	1,714	100·0	533·0	130·0	151·25	304·2	153·33	184·70
IXB	200	1,286	75·0	612·0	90·67	117·67	256·1	150·67	153·78
IXC	133	856	50·0	393·33	81·33	115·17	166·0	126·33	122·21
XA	160	686	120·0	460·0	92·67	109·0	270·4	143·33	153·85
XB	114	486	85·0	480·0	78·0	76·58	172·0	122·33	112·23
XC	67	286	50·0	346·66	74·67	21·83	171·0	86·0	88·37
XIA	200	428	225·0	493·33	68·0	83·25	297·1	112·33	140·17
XIB	150	321	169·0	376·66	68·0	58·92	206·0	96·0	107·23
XIC	100	214	112·5	213·33	74·67	33·13	176·7	76·0	90·12
XIIA	400	428	150·0	500·0	67·33	103·54	267·0	120·33	139·55
XIIB	266	284	100·0	430·0	64·0	48·0	206·1	97·67	103·94
XIIC	134	142	50·0	264·66	97·33	32·5	160·3	97·67	96·95
XIIIA	354	572	100·0	490·0	88·67	91·92	258·0	168·0	151·67
XIIIB	266	430	75·0	550·0	52·0	57·46	229·5	152·67	122·84
XIIIC	178	286	50·0	326·66	60·67	30·25	173·7	117·67	95·57
XIVA	266	772	100·0	553·33	78·0	106·88	227·3	140·3	138·13

XIVB	200	572	75·0	543·33	66·67	54·33	205·5	107·67	108·54
XIVC	133	372	50·0	316·66	50·0	40·92	168·7	81·0	85·15
XVA	200	428	100·0	540·0	57·33	70·25	219·9	91·33	109·70
XVB	150	321	75·0	416·66	54·67	51·17	197·3	88·33	97·87
XVC	100	214	50·0	194·55	42·67	36·50	154·7	80·33	78·55
XV A	266	572	100·0	623·33	73·33	67·28	238·0	136·67	128·82
XVIB	200	430	75·0	540·0	49·33	61·17	212·5	134·0	114·25
XVIC	133	286	50·0	243·33	40·67	42·33	161·7	104·33	87·0
XVIIA	200	428	150·0	598·0	63·33	67·75	238·8	99·33	117·30
XVIIB	150	321	112·5	570·0	48·67	53·09	197·9	79·33	94·97
XVIIC	100	214	75·0	203·33	40·0	54·08	166·3	71·33	82·93
XVIIIA	266	1,142	100·0	616·66	54·67	114·29	228·0	162·0	139·74
XVIIIB	200	856	75·0	630·0	90·67	58·83	192·7	122·67	116·09
VXIIIC	133	571	50·0	320·0	61·33	64·54	151·3	94·33	92·87
A.—Manure 15 tons per acre Fert. XVIIIB				573·33	134·0	*54·33	270·0	197·0	200·33
B.—Manure 15 tons per acre Fert. XVIIIB				576·66	122·67	*35·75	206·4	188·0	172·36
C.—Manure 7½ tons per acre Fert. XVIIIB				533·33	92·67	*41·17	180·0	117·33	130·0
D.—Manure 7½ tons per acre Fert. XVIIIB				530·0	126·0	*42·0	237·0	163·0	175·33
E.—Manure 15 tons per acre—no Fert				113·33	86·0	*93·92	199·5	109·33	131·61
F.—Manure 7½ tons per acre—no Fert					32·0	*43·5	157·4	93·67	94·36
Check Plots (average)				81·67	53·83	49·15	132·9	66·78	75·66

Note 1.—One half the nitrogen was applied in the form of Sulphate of Ammonia.
Note 2.—One half the phosphoric acid was applied in the form of Basic Slag.
*Omitted from the computation of averages.

In Table No. III we submit the Profit and Loss statement. The minus (−) sign indicates a loss.

TABLE No. III.—Experiment "A," 1915. Results from the first Crop of the Rotation.

Plot.		Cost of Fertilizers	Agassiz. Mangels.	CapRouge Potatoes.	Charlottetown. Potatoes.	Fredericton. Potatoes.	Kentville Potatoes.	Average Profit of Potato Yields.
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
I		6·00	− 7·19	75·75*	4·00	10·70	9·11	7·94
II		13·70	38·92	22·38	− 1·68	35·75	19·91	18·84
III		7·14	37·38	8·28	6·47	19·61	− 6·70	6·90
IV		10·26	39·98	4·49	7·58	41·24	3·35	14·04
V.		3·75	− 7·80	− 3·58	10·34	26·20	3·69	9·14
VI		13·08	7·92	− 2·33	− 9·99	8·97	21·86	4·63
VII	A	32·22	37·08	19·86	−21·23	47·18	6·22	10·17
	B	24·15	45·15	28·93	− 6·85	20 60	10·79	13·37
	C	16·11	21·27	3·97	−18·02	25·34	− 2·50	2·20
VIII	A	29·88	45·60	20·53	5·88	41·17	22·73	22·40
	B	22·41	62·59	10·01	1·26	42·64	24·20	20·43
	C	14·94	29·11	8·14	− 4·06	10·31	5·17	4·89
IX	A	27·62	36·86	10·46	24·43	58·03	15·65	26·90
	B	20·71	65·05	− 2·29	13·55	40·89	21·23	18·35
	C	13·81	30·71	− 0·06	19·20	2·74	15·96	9·46
X	A	14·66	39·39	4·76	15·26	39·43	23·61	24·43
	B	10·40	49·08	1·68	3·31	9·15	17·37	7·88
	C	6·12	31·74	4·30	−19·78	12·93	3·49	0·23
XI	A	15·90	42·91	− 7·82	1·15	66·20	6·87	16·35
	B	11·92	30·22	− 3·84	− 7·04	24·63	2·89	3·86
	C	7·95	10·86	2·47	−15·96	13·95	− 3·34	− 0·72
XII	A	20·03	39·73	−13·28	7·16	47·02	6·74	11·91
	B	13·32	36·44	− 7·22	−13·89	23·28	2·27	0·82
	C	6·69	19·45	15·06	−15·01	7·01	8·80	3·95
XIII	A	18·84	40·92	− 1·42	2·54	43·71	31·77	19·16
	B	14·13	52·77	−15·04	− 9·98	34·17	28·81	9·46
	C	9·42	25·58	− 6·00	−18·82	10·98	16·02	0·53
XIV	A	18·20	49·18	− 6·12	10·66	29·00	18·57	13·03
	B	13·65	52·30	− 7·23	−11·06	22·65	4·79	2·79
	C	9·10	24·47	−11·01	−13·21	8·80	− 1·99	− 4·36
XV	A	12·78	52·70	−11·03	− 2·23	30·72	− 0·51	4·24
	B	9·58	38·28	− 9·18	− 8·57	22·62	1·19	1·52
	C	6·39	9·75	−11·97	−12·71	4·51	0·38	− 4·95
XVI	A	16·20	61·17	− 6·45	− 7·14	36·35	18·74	10·38
	B	12·15	53·33	−14·40	− 6·14	27·15	21·46	7·14
	C	8·10	14·99	−14·68	−11·51	6·30	10·67	− 2·43
XVII	A	14·00	59·62	− 9·25	− 4·70	38·95	2·27	6·82
	B	10·50	59·26	−12·58	− 8·53	22·00	− 4·23	− 0·85
	C	7·00	10·38	−13·91	− 4·54	9·70	− 4·73	− 3·37
XVIII	A	21·90	54·53	−22·32	11·67	20·65	25·71	10·14
	B	16·43	61·90	1·99	−11·59	13·47	11·51	3·78
	C	10·95	23·10	− 7·20	− 2·26	− 1·75	2·82	− 2·35
A		25·50	44·74	14·58	−22·91*	43·05	39·61	36·85
B		25·50	45·21	8·92	−32·20*	11·25	35·11	22·85
C		18·00	46·52	1·42	−21·99*	5·55	7·27	9·17
D		18·00	46·05	18·08	−21·57*	34·05	30·11	31·83
E		15·00	−10·48	1·08	7·38*	18·30	6·27	12·97
F		7·50	.....	18·41	− 9·82*	4·75	5·94	1·85
Checks		0·00	.....	.....	.....	.....	.....	.....

*Not included in calculation of averages.

Discussion of the Profit and Loss Statement of Experiment "A".

It will be seen that not only has plot A (fertilizer XVII B with manure) produced the highest average yield, but also the greatest average profit. In respect to both yield and profit it stands first at Kentville and sixth at Fredericton. In degree of profit it stands ninth at Cap Rouge, while at Charlottetown, for reasons already stated, a loss is recorded.

The second highest average profit is shown by plot D (fertilizer XVII B with one-half manure). This plot produced the fourth largest average yield. The fertilizer treatment of this plot was identical with that of plot A but it received only one-half the quantity of manure applied to the latter plot.

The highest profit goes to plot IX A which ranked second in the yield averages. This plot gave also the greatest profit at Charlottetown, and similarly takes second place at Fredericton.

The fourth highest average profit is yielded by plot X A, which took seventh place in the yield averages.

The fifth highest average profit is produced by plot B (fertilizer XVII B with manure) which ranked fifth also in the yield averages.

Sixth in the list of average profits appears plot VIII A, which stood third in point of average yield. Plot VIII B, which received three-fourths of the quantity of the same fertilizer mixture as was applied to plot VIII A, ranks seventh in the list of average profits and produced the sixth largest yield.

Eleventh in the list of average profits we find plot XI A which produced the twelfth largest average yield. This plot (receiving the maximum potash application) yielded the greatest profit at Fredericton and stood second in point of yield at that Station.

It should be noted that plot I at Cap Rouge has, for reasons already advanced, been omitted from the calculation of average profits.

General Results indicated from First Year's Investigation.

In recording the prominent positions occupied by plots A, B, and D in respect to both yield and profit, we would again emphasize the fact that these plots received manure in addition to the comparatively light application of fertilizer XVII B (corresponding to 150 pounds of nitrate of soda, 121 pounds of acid phosphate and 112·5 pounds of muriate of potash, per acre).

It is significant that at Fredericton the plots IX A, XI A, and VII A, receiving the maximum applications of phosphoric acid, potash and nitrogen, respectively, ranked first, second, and third, in point of yield; furthermore, that these same plots, in the order of XI A, IX A and VII A, produced the largest profits.

Such results lead us to think that the scheme adopted may not include the limits of the maximum profitable applications of nitrogen, phosphoric acid, and potash. Further, they might be construed as justifying the very large quantities of fertilizer frequently employed on the potato crop in New Brunswick. Probably, in conjunction with a moderate quantity of manure, smaller applications of the same fertilizer mixtures which were applied to the aforementioned plots, might prove more profitable.

Our opinion in this respect is supported by the fact that plot A (fertilizer XVII B with manure) at Fredericton gave the sixth largest profit ($43.05), while plot XVII B (no manure) showed a profit of only $22.

The results indicate, at least, the desirability of extending this research work at Fredericton.

The relatively high position occupied by plot A, and low position of plot XVII B (which received the same fertilizer as was applied to plot A, but no manure) at all the Stations (excepting Charlottetown) furnish a strong argument in support of the well-established theory that manure, with a judicious addition of fertilizers, is the most

profitable general practice. On the light sandy soil at Kentville, where the manured plots A and B have yielded both the largest yields and the largest profits, the correctness of this theory is fittingly borne out.

That manure alone has not proved highly profitable may be learned by comparing the yields and profits from plots A, B, C, and D with those from plots E and F.

Without presuming to exceed our license in drawing conclusions from the results at this stage of the investigation, we may go a step further in our endeavours to explain some of the apparent inconsistencies.

The Results from Experiment "A" at Fredericton.

Of all the Stations on which this experimental work is being conducted, that at Fredericton (situated, as it is, in a district where potato-growing is pre-eminent) fulfils most nearly the ideal conditions as to soil and climate for the successful cultivation of the potato crop. A comparison of the yields obtained at Fredericton with those at the other Stations supports this claim.

It is chiefly to Fredericton, then, that we should naturally look for reliable information on potato fertilizing, and what do we find?

Let us compare the fertilizer mixtures applied to the four plots which give the greatest profits at Fredericton. They follow in tabulated form:—

A Comparison of the Results from the four leading Plots at Fredericton.

Plot.	Fertilizing in Pounds per Acre.			Yields per Acre in Bushels	Cost of Fertilizers per Acre.	Profit per Acre.
	Nitrate of Soda.	Acid Phosphate.	Muriate of Potash.			
					$ cts.	$ cts
XI A	200	428	225	297·1	15·90	66·20
IX A	266	1,714	100	304·2	27·62	58·63
VII A	800	572	100	291·7	37·22	47·18
XII A	400	428	150	267·0	20·03	47·02

The "law of minimum," as applied to plant nutrition, teaches that the essential plant-food substance present in relatively smallest quantity will prove to be the limiting factor in crop production, because an excess of one element cannot compensate for the deficiency of another, each having its own special function to perform.

A superficial examination of the results under consideration seems to refute this theory, for do we not find that plot IX A, which received four times the quantity of phosphoric acid, but less than half the quantity of potash applied to plot XI A, produces a yield practically equal to that of the latter? Likewise, plot VII A, which received four times the amount of nitrogen applied to plot XI A, one-third the amount of phosphoric acid, and the same amount of potash applied to plot IX A, yields similarly to those two plots. All these plots (XI A, IX A, and VII A) with widely varying applications of fertilizers yield almost identically.

In comparing the fertilizing of plots XI A and XII A, we find that the latter received twice as much nitrogen, the same amount of phosphoric acid, but 75 pounds less muriate of potash, per acre, and yielded 30 bushels less than plot XI A, which might be taken to indicate that, on plot XII A in the combination used the nitrogen was in excess and the potash deficient.

Now, we believe that both the soda, resulting from the removal by the crop of the nitrogen in the nitrate of soda and the sulphate of lime (gypsum) which is present in acid phosphate, exert an appreciable influence in liberating potash from insoluble soil

compounds. This theory has been amply supported by the results of investigations conducted at Rothamsted and other agricultural experiment Stations, and, in view of the present potash scarcity, we have been advocating a more extensive use of acid phosphate and nitrate of soda as potato fertilizers.

It is only natural, therefore, for us to entertain the suggestion that in these results at Fredericton a confirmation of this theory has been found. Indeed, if we were obliged to draw final conclusions at this juncture, it is the only conceivable opinion which could be formed.

Until further investigations either confirm or disprove this theory, we are bound to assume that the very large quantities of nitrate of soda and acid phosphate, respectively, entering into the mixtures applied to plots VII A and IX A have overcome the deficiency of potash in the fertilizer, by liberating potash from the soil, and that where (in plot XI A) a larger amount of potash was applied in the fertilizer a smaller amount of nitrogen and phosphoric acid sufficed to satisfy crop requirements.

A comparison of the yields from plot VIII C and XVI A at Fredericton lends further support to our argument. Both these plots received the same quantities of nitrogen and phosphoric acid (corresponding to application of 266 pounds of nitrate of soda and 572 pounds of acid phosphate, per acre) which might be deemed to approximate the correct amounts for use without manure. But plot VIII C received only 50 pounds of muriate of potash while plot XVI A received 100 pounds per acre, the additional 50 pounds of muriate of potash producing an increase of 54·6 bushels.

By referring back to plot XI A, which received smaller applications of nitrogen and phosphoric acid than those applied to plots VIII C and XVI A, but the maximum application of potash (225 pounds of muriate of potash) we find that plot XI A gave an increase of 113·7 bushels over the yield from plot VIII C, and of 59·1 bushels over the yield from plot XVI A.

We thus reach the conclusion that at Fredericton the results indicate particular and profitable response to potash. It is further significant that we have no proof that in the highest amount of potash used we have reached the maximum profitable potash application for the potato crop, at least where the fertilizers have not been supplemented by manure.

We may point also to the relatively small yields and profits obtained from the C plots in each series which received the smallest quantity of each mixture and, incidentally to the fact that in only a few instances did these receive more than 50 pounds of muriate of potash, per acre.

The manured plots at Fredericton occupy a relatively high position. Plot A, which received 15 tons of manure per acre, in addition to fertilizer XVII B, takes sixth place in point of yield and divides fifth place with plot XIII A in the scale of profits.

This result emphasizes the importance of manure, and suggests the probability that, had the manure on plot A been supplemented by a more liberal application of fertilizers, larger and more profitable returns might have been recorded.

The Mangel Crop in Experiment "A" at Agassiz—Discussion of the Results.

Owing to the very low average yield of the check plots at Agassiz, the profits from the use of fertilizers at this Station appear relatively high, although none of the plots produced extra large yields.

Plot VIII B, which received a fertilizer equal to 400 pounds of nitrate of soda, 856 pounds of acid phosphate, and 75 pounds of muriate of potash, per acre, produced both the largest yield and the greatest profit. Apparently the fertilizer used contained the maximum amounts of nitrogen, phosphoric acid and potash required by the mangel crop on this soil.

Plot XVIII B, which received the same quantities of phosphoric acid and potash as plot VIII B, but the equivalent of only 200 pounds of nitrate of soda ranks second in point of profit.

Plot XVI A, which received the equivalent of 266 pounds of nitrate of soda, 72 pounds of acid phosphate, and 100 pounds of muriate of potash, per acre, ranks third in respect to both yield and profit.

Next in order of yield and profit comes plot XVII A, which received the equivalent of 200 pounds of nitrate of soda and 428 pounds of acid phosphate and 150 pounds of muriate of potash, per acre.

Plots XVIII A, IX B and VII A have produced larger yields than plot XVII A, but the increases did not suffice to repay the extra cost of the fertilizers used on these plots.

The manure plots A and B follow plot XVII A, and occupy seventh and eighth places in the scale of yield and thirteenth and fifteenth places in the scale of profits.

The general irregularity in the results is unfortunate, and, in this case, we are unable to resort to a study of averages, so shall abstain from further comment until the investigation has reached a more advanced stage.

EXPERIMENT "B".

To ascertain the relative efficiency of different sources of nitrogen and phosphoric acid.

Experiment "B" is an accompaniment to experiment "A," and is being conducted at the Stations, already named.

The rotation is the same as that in experiment "A," viz., hoed crop, grain, hay.

By reference to table No. IV, it will be seem that muriate of potash is applied to each of the fifteen plots in the area, at the rate of 150 pounds per acre.

In each series of three plots (A, B, C) the material under test is applied at three rates per acre, in the proportions of 4, 3, 2, the amounts of the constituents of the fertilizers remaining constant.

In series I, nitrogen is applied in the form of nitrate of soda, the phosphoric acid being furnished by equivalent quantities of acid phosphate and basic slag.

In series II, corresponding quantities of sulphate of ammonia replace the nitrate of soda, the other fertilizing being the same as in series I.

Thus the results from the A, B and C plots of the first series are directly comparable with those from the A, B, and C plots of the second series.

Similarly, in the third, fourth, and fifth series, respectively, acid phosphate, basic slag, and bone meal are tested individually as sources of phosphoric acid, the nitrogen being derived equally from nitrate of soda and sulphate of ammonia.

TABLE IV.—Experiment "B," 1915. Results from the First Crop of the Rotation.

A Comparison of various Sources and Quantities of Nitrogen and Phosphoric Acid. Potash being applied to all Plots.

Plot No.	Fertilizing per acre.					Total Yields per acre (in bushels).						
	Nitrate of Soda.	Sulphate of Ammonia.	Acid Phosphate	Basic Slag.	Bone Meal.	Muriate of Potash.	Agassiz. — Mangels.	Cap Rouge. + Potatoes.	Charlottetown. — Potatoes.	Fredericton. — Potatoes.	Kentville. — Potatoes.	Average of potato yields.
I.....A	133	.....	200	200	.....	150	470	64·0	63·54	195·4	112·0	108·73
B	100	.....	200	200	.....	150	420	58·0	58·33	184·0	129·33	107·66
C	66	.....	200	200	.....	150	367	46·0	67·25	194·0	76·0	95·81
II.....A	.....	100	200	200	.....	150	260	53·33	49·84	197·3	98·67	99·78
B	.....	75	200	200	.....	150	290	40·0	56·0	197·3	109·33	100·66
C	.....	50	200	200	.....	150	293	28·0	52·17	166·3	92·33	56·47
III A	100	75	400	.....	.....	150	357	59·33	63·08	200·3	127·0	112·43
B	100	75	300	.....	.....	150	270	30·67	58·33	179·7	124·67	98·34
C	100	75	200	.....	.....	150	357	24·0	50·83	154·8	114·0	85·91
IV.....A	100	75	.....	400	.....	150	353	24·0	53·21	207·6	113·0	99·45
B	100	75	.....	300	.....	150	330	20·67	48·37	179·3	104·0	88·08
C	100	75	.....	200	.....	150	337	18·67	50·83	189·0	90·0	87·12
V.....A	100	75	.....	.....	350	150	377	20·67	43·0	165·0	110·33	84·75
B	100	75	.....	.....	263	150	500	12·67	44·63	204·8	103·33	91·41
C	100	75	.....	.....	175	150	353	20·0	27·0	196·2	74·67	79·45

Discussion of the Results.

Table IV contains a record of the fertilizer applied to, and the yields, per acre, obtained from the plots of experiment "B" in the first year of the rotation.

A study of the averages does not reveal the same degree of consistency as prevailed in the yields from experiment "A." The yields also are smaller throughout, but this may be accounted for probably in the fact that the applications of nitrogen and phosphoric acid were less than those used, in the majority of instances, in the plots of experiment "A," and were apparently insufficient, in the absence of manure, to produce maximum yields.

Except at Fredericton, where there is little to choose between the results obtained from nitrate of soda and those from sulphate of ammonia, nitrate of soda has shown itself somewhat more effective than sulphate of ammonia, as a source of nitrogen, judging by the returns from the first crop.

Again excepting Fredericton, a study of the yields in series II, IV, and V shows acid phosphate superior to both basic slag and bone meal as a source of phosphoric acid

On the potato crop, especially, this was to be expected, since the phosphoric acid in acid phosphate is more readily available than that in basic slag, and still more so than that in bone meal.

In the second and third year of the rotation, however, we may expect both the basic slag and bone meal series to take the lead over the acid phosphate series, for we naturally assume that, on account of their slower action, a greater part of the virtue of basic slag and bone meal is residual in the soil.

However, we must not anticipate final results, but await the conclusion of the rotation, when the records of the three years will be compiled and final and more definite deductions drawn therefrom.

ADDITIONAL INVESTIGATIONAL WORK WITH FERTILIZERS AT FREDERICTON.

Besides experiments "A" and "B," already described, other fertilizer tests are in progress at this Station, the results of which, for the year 1915, are now available.

EXPERIMENT III.—SECOND YEAR OF ROTATION.[1]

To ascertain the relative efficiency of nitrogen, in the forms of fish scrap, nitrate of soda, and sulphate of ammonia, and of phosphoric acid in acid phosphate and basic slag.

The fertilizers, which were compounded in mixtures corresponding to the formula 4-8-10, were applied to the plots in the spring of 1914. No fertilizer was applied in 1915.

Potatoes were grown as the first crop of the rotation (1914), the second crop being oats, the yields of which are recorded in table V.

[1] Referred to as Experiment I in the 1915 Report.

TABLE V.—Experiment III at Fredericton, 1915. Second Crop of Rotation, Oats. To ascertain the relative Value of Nitrogen and Phosphoric Acid in Various Forms, Potash being applied to all except the check plots.

Plot.	Fertilizers applied to Potato Crop in 1914.						Yields (in bushels) per acre Oats 1915.			
	Nitrate of Soda.	Sulphate of Ammonia.	Fish Scrap.	Acid Phosphate.	Basic Slag.	Muriate of Potash.	Duplicate Plots.		Average	Increase over Check Plots.
A	.....	.....	.....	.....	.....	.....	45·88	39·41	42·64	.....
B	62·5	50	.....	266·5	.....	100	51·76	51·76	51·76	9·12
C	62·5	50	.....	.....	266·5	100	43·52	48·23	45·87	3·23
D	.....	.....	215	233·5	.....	100	34·11	47·05	40·58	−2·06
E	.....	.....	215	.....	233·5	100	50·58	54·11	52·34	9·70
F	31·0	25	108	117·0	116·0	100	45·88	58·52	52·35	9·71
G	94·0	75	.....	.....	400·0	150	50·58	42·35	46·46	3·82
H	.....	.....	323	.....	350·0	150	41·17	47·05	44·11	1·47
I	62·0	50	216	234·0	232·0	200	43·52	47·05	45·28	2·64

NOTE.—A is the Check Plot.

Discussion of the Results from Experiment III.

Unfortunately, in many cases, the difference in yield, occurring between duplicate plots similarly treated, is often greater than the difference between the yields from fertilized and check plots. For this reason, we can not accept the results at this stage as sufficiently satisfactory for the purposes of making deductions.

However, it is quite evident in the great majority of cases that there has been a very considerable after effect of the fertilizers. This is made evident by the increased yields from the plots in the second year of the rotation.

EXPERIMENT IV.[1]—SECOND CROP OF ROTATION: OATS.

To ascertain the effect of applying fertilizers to each crop of the rotation.

In the year 1914 this experiment was commenced, potatoes being the crop grown. The fertilizing scheme is recorded in Table VI. In the spring of 1915, one-half of each plot (excepting the check plots) was treated to another application of the same fertilizer which had been applied in the preceding year. Oats followed as the second crop.

[1] Referred to as Experiment III in the 1915 Report.

TABLE VI.—Experiment IV at Fredericton, 1915. Second Crop of Rotation: Oats.

To ascertain the Effect of applying Fertilizer to each Crop of the Rotation.

Plot.	Fertilizers applied to Potato Crop in 1914 and again to one-half each fertilized in 1915 (pounds per acre.)						Yields (in bushels) per acre from Half Plots not fertilized in 1915.				Yields (in bushels) per acre from Half Plots fertilized again in 1915.			
	Nitrate of Soda.	Sulphate of Ammonia	Bone meal.	Acid Phosphate.	Basic Slag.	Muriate of Potash.	Duplicate plots.		Average.	Increase over check plots.	Duplicate plots.		Average.	Increase over check plots.
J							32·35	31·17	31·76		32·35	31·17	31·76	
K	140			150	150	101·2	54·11	64·70	59·40	27·64	56·47	63·52	59·99	28·23
L		105		150	150	101·2	52·94	45·88	49·41	17·65	58·82	36·47	47·64	15·88
M	70	52		300		101·2	62·35	51·76	57·05	25·29	38·82	41·17	39·99	8·23
N	70	52			300	101·2	61·17	75·29	68·23	36·47	51·76	60·00	55·88	24·12
O	50	37·5	240			101·2	69·41	41·17	55·29	23·53	57·64	52·94	55·29	23·53
P							30·00	33·52	31·76		30·00	33·52	31·76	

J and P are check plots.

Discussion of the Results from Experiment IV.

The plots of experiment IV are in duplicate, and again we are confronted with a considerable discrepancy between the yields from plots which have been treated identically.

A comparison of the yields, from the half plots not fertilized in 1915, with those from the check plots, reveals a very large increase attributable to the residual influence of the first year's fertilizing.

Strange to say, the effect of the second application of fertilizer appears to have reduced yields on all but three of the plots.

Although large increases from the use of fertilizers on oats following a potato crop which has been fertilized, was not to be expected, yet we are somewhat at a loss to account for the apparent effect of the additional fertilizer in depressing the yields.

EXPERIMENT WITH TURNIPS.

To ascertain the Influence of Basic Slag alone and in Conjunction with a Nitro-Potassic Fertilizer.

In the following experiments a crop of turnips was grown on a 4-acre area which had in the previous year (1914) received 16 tons of barnyard manure per acre. No further manure was applied in 1915, but fertilizers were furnished, as indicated in table VII.

TABLE VII.—At Fredericton: Experiments on Turnips, 1915.

Plot.	Fertilizing (in Pounds) per Acre.					Yield in Bushels per Acre.
	Nitrate of Soda.	Sulphate of Ammonia	Acid Phosphate.	Basic Slag	Muriate of Potash.	
1	No Fertilizer					523·0
2				500		698·7
3	50	50	250	500	50	876·0

The results show an increase of nearly 176 bushels per acre from the use of 500 pounds of basic slag alone, and a further increase of 177 bushels more where, in addition to the basic slag, comparatively small quantities of active source of nitrogen, phosphoric acid and potash were applied.

The yield on the complete fertilizer plot (No. 3) was somewhat diminished by an attack of "club root." Possibly a slightly acid condition of the soil produced by the sulphate of ammonia and acid phosphate may have favoured the development of club root, on the plot, although the presence of such an alkaline material as basic slag might have been expected to neutralize any excess of acidity arising from this source.

EXPERIMENT WITH CORN.

To ascertain the Influence of Basic Slag alone and in Conjunction with a Nitro-Potassic Fertilizer.

This was conducted on newly cleared land, corn being the crop employed. Two varieties, White-Cap Yellow Dent and Wisconsin No. 7, were grown. Manure was applied in the spring at the rate of 16 tons per acre, to the whole area, the fertilizing

being as follows: Basic slag was applied broadcast, at the rate of 400 pounds per acre, over the whole field, and harrowed in. A portion of the field received in the row at planting time, a mixture of 50 pounds of nitrate of soda, 50 pounds of sulphate of ammonia and 50 pounds of muriate of potash, in addition to the basic slag. During the early part of the season unfavourable weather conditions retarded crop developments. Until September 1 the complete fertilizer plot appeared superior, but at harvesting, on September 28, no difference between the plots was perceptible to the eye.

TABLE VIII.—At Fredericton: Fertilizer Experiment with Corn on newly cleared Land.

Plot.	Manure.	Fertilizing per Acre (in Pounds).				Yields per Acre.	
		Nitrate of Soda.	Sulphate of Ammonia.	Basic Slag	Muriate of Potash.	White Cap	Wisconsin No. 7.
	Tons.					Tons. Lb.	Tons. Lb.
1	16	.....	.....	400	.....	5 1,347	7 351
2	16	50	50	400	50	5 1,855	6 289

FERTILIZER EXPERIMENT IN HORTICULTURAL WORK AT FREDERICTON.

To ascertain whether a medium Application of Manure supplemented by Fertilizers will prove more profitable than a heavy Application of Manure alone.

The tests commenced with garden vegetables in 1914 were continued in 1915.

In the former year one portion of the area received manure alone, at the rate of 30 tons per acre, while the remainder of the area received 15 tons of manure per acre, supplemented by fertilizers which varied in quantity and proportion according to the nature of the vegetable under test. In 1915, the treatment as to manure and fertilizers was identical to that of 1914.

The primary object of this experiment is not to determine the most economical fertilizer mixture for use in vegetable growing but, as already stated, to ascertain whether it may not be more profitable, in general practice, to use half the ordinary quantity of manure in conjunction with commercial fertilizers, than to rely on the full quantity of manure alone.

It is intended to continue the experiment for a period of years, so that the effects of the different treatments on the texture and fertility of the soil may be observed.

The results for the year 1915 are set forth in the following tables:—

TABLE IX A.—Fertilizer Experiment with Carrots, Turnips and Parsnips at Fredericton.

Variety.	Plot A. — Manure alone.		Plot B. — Manure, 15 tons per acre. Nitrate of Soda, 130 lb. Acid Phosphate, 400 lb. Muriate of Potash, 120 lb.		Increase in Yield over Manure alone.	
	Yield per acre.		Yield per acre.			
Carrots.	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
Danver's Improved Half Long	580	40	592	18	11	28
Early Scarlet Horn	446	34	459	18	12	34
Half Long Chantenay	559	34	744	24	184	40
Average of Carrot yields	529	3	598	36	69	33
Turnips.						
Bangholm Purple Top	1,320	—	1,584	—	264	—
Best of All	1,710	36	1,900	40	190	4
Carter's Invicta	1,119	18	1,161	30	42	12
Favorite	1,193	14	1,103	40	—84	24
Hall's Purple Top	1,077	6	1,108	40	31	34
Skirving's Purple Top	1,244	4	1,393	46	149	42
Sutton's Purple Top	1,372	40	1,478	20	105	30
Westbury Purple Top	1,383	18	1,584	—	200	32
Average of Turnip yields	1,302	29	1,427	27	124	48
Parsnips.						
Improved Hollow Crown	554	16	568	24	14	8
Intermediate	462	—	488	16	26	16
Average of Parsnip yields	508	8	528	20	20	12

Discussion of the Results recorded in Table IX A.

Estimating the value of the manure at $1 per ton, the manure application to plot A would represent a cost of $30 per acre, while the cost of the manure and fertilizer applied to plot B is placed at $25.16.

The results from the experiments with root crops (carrots, turnips, and parsnips) furnish strong evidence in favour of the combined manure and fertilizer application. Under normal conditions of the fertilizer market the cost of the treatment accorded plot B would be considerably less than that of the full quantity of manure alone, so that the profit is greater than the plain statement of increased yields would indicate.

In one instance (a single variety in the turnip area) has plot A produced a greater yield than plot B, a striking exception which proves the general consisteney of the results.

TABLE IX B.—Fertilizer Experiment with Celery and Onions at Fredericton.

Variety.	Plot A. — Manure alone. 30 tons per acre		Plot B. — Manure, 15 tons per acre. Nitrate of Soda, 240 lbs. Acid Phosphate, 480 lbs. Muriate of Potash, 200 lbs.		Increase in Yield over Manure alone.	
	Yield per acre.		Yield per acre.			
	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.
Celery.						
Evans Triumph	20	1,800	24	1,720	3	1,920
French Success	16	120	28	1,200	12	1,080
Giant Pascal	34	1,520	37	800	2	1,280
Nolls Magnificent	19	1,600	27	1,000	7	1,400
Winter Queen	21	240	29	1,840	8	1,600
Average of Celery yields	22	1,272	29	1,312	7	40
Onions.						
Ailsa Craig	5	1,880	9	1,800	3	1,920
Danvor's Yellow Globe (from seed)	25	160	27	1,176	2	1,016
Danver's Yellow Globe (from sets)	25	1,480	27	1,440	1	1,960
Johnson's Dark Red Beauty	7	1,840	17	1,640	9	1,800
Largo Red Wethersfield (from seed)	7	1,840	13	400	5	560
Large Red Wethersfield (from sets)	23	200	23	860	—	660
Red Globe	12	1,080	19	280	6	1,200
Salzer's Giant Red Wethersfield	11	1,760	15	1,680	3	1,920
White Globe	12	1,080	16	1,000	3	1,920
Average of Onion yields	14	1,480	19	37	4	557

Discussion of the Results recorded in Table IX B.

The fertilizer application used in the celery and onion experiments is heavier than that applied to the experiment recorded in table IX A, bringing the cost of the treatment of plot B, in this case, to $31.15 or $1.15 in excess of the manure cost on plot A.

Remarkable consistency is again noticeable, and the yields of plot B, receiving both manure and fertilizer, exceed the corresponding yields of plot A without a single exception.

TABLE IX C.—Fertilizer Experiment with Tomatoes at Fredericton.

Variety.	Plot A. — Manure alone, 30 tons per acre.						Plot B. — Manure, 15 tons per acre. Nitrate of Soda, 120 lbs. Acid Phosphate, 600 lbs. Muriate of Potash, 175 lbs.						Increase in Yield over Manure alone.	
	Yield per acre.						Yield per acre.							
	Ripe.		Green.		Total.		Ripe.		Green.		Total.			
	Tons.	Lb.	Tons.	Lb.	Tons.	Lb.	Tons.	Lb.	Tons.	Lb.	Tons.	Lb.	Tons.	Lb.
Bolgiano E. E. Wealthy	17	816	4	1,248	22	64	18	209	3	528	21	737	—	1,327
Rennie's Earliest	9	1,040	5	1,424	15	464	14	288	3	1,072	17	1,360	2	896
Line Bred N. Adirondack	12	1,568	1	984	14	552	14	1,376	3	1,072	18	448	3	1,896
Bonny Best	7	1,232	6	512	13	1,744	11	1,936	7	1,232	19	1,168	5	1,424
Johnson Jack Rose	11	1,120	2	896	14	16	05	1,968	9	1,584	15	1,552	1	1,536
Chalk's Early Jewel	11	1,120	4	1,792	16	912	03	1,072	17	272	20	1,344	4	432
Sunnybrook Earliana	9	1,448	6	512	15	1,960	09	1,856	5	336	15	192		−1,768
Alacrity 12 B	12	1,004	3	1,616	16	620	11	1,392	5	336	16	1,728		908
Alacrity 14 B	17	1,904	3	1,072	21	976	14	1,376	7	1,776	22	1,152	1	176
Prosperity	10	672	2	1,984	14	656	12	480	2	1,984	15	464		1,808
Matchless	8	1,136	4	1,792	13	928	12	210	3	1,344	15	1,554	2	626
Trophy	7	144	4	160	11	304	10	944	4	704	14	1,648	3	1,344
Livingstone Globe	14	832	5	336	20	168	14	1,920	3	1,072	18	992	−1	1,176
Ponderosa	14	1,920	4	1,248	19	1,168	17	816	5	336	22	1,152	2	1,984
Ponderosa Golden	12	1,548	3	1,072	16	620	17	272	2	1,984	20	256	3	1,636
Average increased yield on Fertilizer Plot													2	26

Discussion of the Results recorded in Table IX C.

The combined cost of the fertilizer and manure used on plot B of the Tomato experiment is intermediate between those used in the two preceding experiments, being represented by $28.25.

To satisfy the tomato's well-known appetite for phosphoric acid, a larger quantity of acid phosphate (with smaller amounts of nitrate of soda and muriate of potash) has been applied to plot B than in the preceding experiments.

Of 15 varieties of tomatoes included in the test, but three failed to show an increase in yield from plot B over those from plot A, again furnishing evidence as to the value of manure with fertilizers.

TABLE IX D.—Fertilizer Experiment with Peas at Fredericton.

Variety.	Length of Row.	Plot A. — Manure alone, 30 tons per acre. Row A. Cost of Fertilizer per row, 9 cents.		Plot B. — Manure, 15 tons per acre. Acid Phosphate, 320 lbs. Muriate of Potash, 130 lbs. Row B. Cost of Fertilizer per row, 6½ cents.		Increase in yield over Manure alone.	
	Ft.	Lb.	Oz.	Lb.	Oz.	Lb.	Oz.
Advancer	33	29	—	30	—	1	—
American Wonder	33	15	10	18	5	2	11
Dainty Duchess	33	13	11	14	12	1	1
Early Giant	33	29	10	31	8	1	14
Gradus	33	23	7	27	—	3	9
Gregory's Surprise	33	22	6	24	2	1	12
Heroine	33	35	—	37	—	2	—
Juno	33	24	—	25	8	1	8
Premium Gem	33	17	10	15	9	—	—
Quite Content	33	35	15	32	8	—	—
Stratagem	33	21	—	24	—	3	—
Sutton's Excelsior	33	23	10	26	—	2	6
Thomas Laxton	33	24	—	28	8	4	8
Telephone	33	26	—	34	—	8	—
The Laxton	33	23	—	26	—	3	—
Average of Pea yields	.. ....	23	11	26	6	2	11

Discussion of the Results recorded in Table IX D.

The fertilizer application to plot B in this experiment includes phosphoric acid and potash only, the nitrate of soda having been omitted. Peas, the crop grown in this experiment, belong to the natural order Leguminosæ, and plants of this order possess the faculty of obtaining nitrogen from the soil atmosphere by means of certain bacteria which live in small tubercles on their roots and rootlets and might not be expected to respond to a nitrogenous fertilizer provided the soil already possessed the necessary inoculating bacteria. The cost of the manurial and fertilizer treatment on plot B amounts to $21.77 per acre, or 6½ cents per row, as compared with $30 per acre, or 9 cents per row, on plot A.

Only two out of a total of 15 varieties have failed to produce an increased yield on plot B, the area receiving both manure and fertilizers.

General Discussion of the Results from the Horticultural Experiments.

The results obtained in these fertilizer tests on the horticultural area permit of but one conclusion, which is that the evidence proves in an uncontrovertible way the economical advantage of a medium application of manure with suitable commercial fertilizers as compared with the use of a large quantity of manure alone.

Possibly further investigations may suggest the desirability of altering the amounts and proportions of the fertilizer ingredients, the demand for which must necessarily vary according to the condition of soil, climate, the nature of previous cropping, etc.

The fertilizers used in these experiments, however, approximately conform to general usage in market gardening.

It should be pointed out that the plots were treated similarly in 1914, and the results in 1915 are even more pronounced than in the previous year, indicating an after-effect of considerable value from the manure and fertilizers on plot B.

ADDITIONAL INVESTIGATIONAL WORK WITH FERTILIZERS AT KENTVILLE, N.S.

In addition to experiments "A" and "B." already described further work with fertilizers was conducted at the Kentville Experimental Station.

EXPERIMENT III.[1]

To ascertain the relative Value of Dog-fish Scrap, Nitrate of Soda and Sulphate of Ammonia as Sources of Nitrogen and of Acid Phosphate and Basic Slag as Sources of Phosphoric Acid.

Muriate of potash was applied to each plot, in addition to the various forms of nitrogen and phosphoric acid under investigation.

The experiment was commenced in 1914, in which year the fertilizers were applied. Oats were sown the first year and, at the same time, 8 pounds of timothy, 8 pounds of red clover, and 2 pounds of alsike, per acre, were seeded down. There was no application of fertilizer in 1915. The crop of the second year (1915), the results of which are now recorded, was therefore clover and timothy.

The area ocupied by experiment III was planted with apple trees in the spring of 1914, the plots being situated between the tree rows.

The fertilizing is designed to benefit the apple trees as well as the interval culture.

The plots are in duplicate, as will be noticed by reference to table X. Two cuttings were taken of the clover and timothy, the first on July 14 and the second on September 7; the crop was well cured before weighing.

In explanation of the fertilizing schemes in this experiment, it may be stated that the nitrogen, phosphoric acid, and potash in each mixture correspond to the formula 4-8-10.

In quantity the applications of these ingredients to the first five plots are similar. From plots 6 to 10 the amount of the application is increased. Plot 11 received an application of ground limestone, at the rate of 2,000 pounds per acre, in addition to the same fertilizer which plot 3 received.

On plot 1 one-half the nitrogen is applied in the form of nitrate of soda and the other as sulphate of ammonia, acid phosphate being used as the source of phosphoric acid.

The fertilizing of plot 2 differs from that of plot 1 in that basic slag is substituted for acid phosphate.

On plots 3 and 4 the nitrogen is supplied by fish scrap, the phosphoric acid by acid phosphate in the former and by basic slag in the latter.

On plot 5 one-half the nitrogen is derived from nitrate of soda and sulphate of ammonia and the other half from fish scrap, the phosphoric acid being obtained equally from acid phosphate and basic slag.

Where fish scrap is used in the mixture a slightly smaller quantity of phosphatic fertilizer is required, since, in addition to nitrogen, fish scrap contains a small percentage of phosphoric acid.

It will be noted that the fertilizers were applied previous to the seeding of the oat crop in 1914, so that the increased yields from the clover and timothy recorded in table X, may be in part ascribed to the residual influence of the fertilizer, and also to the greater vigour imparted by the direct action of the fertilizer in the first year.

[1] Referred to as Experiment I in 1915 Report.

TABLE X.—Experiment III at Kentville, 1915. Second Crop of the Rotation: Clover and Timothy. To ascertain the relative Value of various Forms of Nitrogen and Phosphoric acid, Potash being applied to all except the check Plots.

Plot.	Fertilizers applied (in lbs. per acre) in the year 1914.						Yield in pounds per acre.			
	Nitrate of Soda.	Sulphate of Ammoni...	Fish Scrap.	Acid Phos-phate.	Basic Slag.	Muriate of Potash.	Total weight of both Cuttings. Duplicate Plots.		Average	Increase over Check Plots.
1	62·5	50	.....	266·5	.....	100	2,870	3,460	3,165·0	760·0
2	62·5	50	.....	.....	266·5	100	1,785	3,665	2,725·0	320·0
3	.....	.....	215	233·5	.....	100	3,930	5,205	4,567·5	2,162·5
4	.....	.....	215	.....	233·5	100	3,440	5,150	4,298·0	1,890·0
5	31·0	25	108	117·0	116·0	100	2,730	3,760	3,245·0	840·0
6	94·0	75	.....	.....	400·0	150	3,980	5,390	4,685·0	2,280·0
7	.....	.....	323	.....	400·0	150	5,215	5,385	5,300·0	2,895·0
8	.....	.....	430	.....	467·0	200	4,720	5,470	5,095·0	2,690·0
9	.....	.....	430	467·0	.....	200	3,490	3,945	3,717·5	1,312·5
10	125·0	100	.....	535·0	.....	200	5,995	6,055	6,025·0	3,620·0
11[1]	.....	.....	215	233·5	.....	100	6,665	6,855	6,760·0	4,355·0
12	.....	.....	.....	.....	.....	.....	.....	.....	[2]2,405·0	.....

[1] Referred to as Experiment III in 1915 Report.
[2] Received 2,000 pounds of Ground Limestone per acre. [3] Average of 3 Check Plots.

Discussion of the Results from Experiment III.

With the exception of one of the duplicate plots (No. 2), every plot in the experiment produced an increase over the average yield of the three check plots (No. 12).

From a comparison of the results of plots 1 and 2 with those of plots 3 and 4 we might feel justified in concluding that fish scrap had proved a more valuable source of nitrogen than nitrate of soda and sulphate of ammonia. But, on comparing the yields of plots 9 and 10, where double quantities of fertilizers were employed, we find the results overwhelmingly in favour of nitrate of soda and sulphate of ammonia. Furthermore, the duplicates of both 9 and 10 show a far greater regularity in their yields.

A comparison of the average results from plot 1 and 3 with those from plots 2 and 4 indicates the superiority of acid phosphate over basic slag as a source of phosphoric acid here, but, again on comparing the yields of plots 8 and 9, where heavier applications are made, we find that the increase recorded on the basic slag plots is more than double that of the acid phosphate plots.

Results from the Lime Plots in Experiment III.

Perhaps the most striking features of the test is the very large increase produced by the application of ground limestone on plot 11. Compare plot 3 with plot 11 and observe also the remarkable degree of consistency in the yields of the duplicate plots, No. 11. In the fall of 1915 the strong growth of the aftermath on these plots made them stand out in striking contrast to the other plots in the series.

EXPERIMENT IV[1].

Originally designed to ascertain the Effects of applying Fertilizers to each Crop of the Rotation.

The application to the different plots were varied in quantity and production in order to make the scheme more comprehensive. It was later decided to modify the plan to the extent of omitting the fertilizer application to the third crop of the rotation (1915); therefore the results of the third year may be attributed to the after-effects of the fertilizer applied in the years 1913 and 1914.

The experiment having now been completed, we are able to record, in table XI, the performance of each plot in the three years of the rotation.

TABLE XI.—Experiment IV: Record of Three Years Rotation at Kentville. To ascertain the Effect of applying Fertilizers to the two first Crops.

Plot.	Fertilizers (in lbs. per acre) applied in 1913 and 1914.						Yields per acre.			
	Nitrate of Soda.	Sulphate of Ammonia.	Bone Meal.	Acid Phosphate.	Basic Slag.	Sulphate of Potash.	Potatoes — 1913.	Grain, 1914.		Clover, Hay — 1915.
							Bush.	Bush.	Lbs.	Lbs.
1	150·0			350·0		150·0	179·5	54	29	2,800
2	150·0				500	150·0	169·0	48	8	4,640
3	150·0		500			150·0	221·5	58	28	4,560
4		150		350·0		150·0	259·5	62	2	3,460
5	150·0			350·0		100·0	172·5	53	18	2,540
6							122·0	30		1,740
7[1]	92·3			215·4		92·3	221·5	48	8	3,920
8[2]	138·5			323·0		138·5	237·5	61	6	4,900
9	150·0			350·0		60·0	213·0	54	4	3,080
10	150·0						183·0	38	18	3,040
11							123·0	32	12	1,360
12[3]	184·6			430·8		184·6	252·5	61	26	5,600
13	150·0			350·0		30·0	164·0	55	10	2,840
14							122·0	25	10	2,320
15						150·0	136·5	27	22	5,300
16	150 0			350·0		KCL150·0	237·0	68	28	5,100
17				350·0			150·5	30	20	3·500
18			500				202·5	37	2	3,720
19							161·5	30		3,000
20				350·0		150·0	162·0	45	20	4,400
21					500		160·0	33	18	6,987
22	150·0				500		196·5	54	4	9,521
23	150·0					150·0	195·0	54	24	5,320
24	150·0			350·0			165·5	58	28	4,900

NOTE.—Plots 6, 11, 14 and 19 are check plots.
[1]Same mixture as on Plot 1, applied at rate of 400 lbs. per acre.
[2]Same mixture as on Plot 1, applied at rate of 600 lbs. per acre.
[3]Same mixture as on Plot 1, applied at rate of 800 lbs. per acre.

Discussion of the Results from Experiment IV.

The mixture applied to plot 1, at the rate of 650 pounds per acre, is identical in composition with that applied to plots 7, 8, and 12 but to the latter three it was applied at the rates of 400, 600, and 800 pounds per acre, respectively. The composition of this mixture corresponds to the formula 3-5-8-6-11-5.

On the potato crop (1915) the increasing quantities of this mixture produced proportionate increases in yield. If we include plot 1, which for some reason yielded less than any of the other three, this statement would not hold good.

Plot 4, which differs from plot 1 in that it received 150 pounds of sulphate of ammonia instead of a liko quantity of nitrate of soda, gave the largest yield of potatoes and the second largest yield of oats (1914). However, this result may not be taken to prove the superiority of sulphate of ammonia over nitrate of soda, since 150 pounds of the former is equal to 200 pounds of the latter.

On plots 2, 21, and 22, where basic slag is employed as a source of phosphoric acid, the yields of potatoes (1913) and oats (1914) are not remarkably large, but the more favourable influence of basic slag—as compared with acid phosphate—is distinctly noticeable on the clover crop in 1915. Compare plot 1 with plot 2, plot 17 with 21, and plot 22 with plot 24.

While certain of the results are somewhat conflicting the weight of evidence collected during the three years unquestionably proves that the fertilizers were (in varying degrees) profitably employed.

Table XI A, which follows, is complementary to table XI, and here we have endeavoured to show the profits accruing from the employment of the various fertilizers. Accordingly, we have deducted the cost of the fertilizers (applied in 1913 and 1914) from the value of the increase produced during the three years, the result representing the profit. It is safe to assume, of course, that during the next two years, at least, further increases will be recorded from the residual influence of the fertilizers in the soils.

Prices used in computing the Profits.

For the purpose of these estimates the following prices have been applied to the various commodities.

Fertilizers—

Nitrate of soda	per ton.	$ 60 00
Sulphate of ammonia	"	80 00
Bone meal	"	30 00
Acid phosphate	"	16 00
Basic slag	"	16 00
Sulphate of potash	"	50 00

Produce—

Potatoes	Cents per bushel	0 50
Oats	"	0 50
Clover (hay)	Per ton.	$15 00

While these figures are necessarily arbitrary ones, they are sufficiently accurate to furnish a reliable basis for our calculation.

Table XI A.—Experiment IV at Kentville—Profit and Statement.

Plot.	Total Cost of Fertilizers applied in 1913 and 1914	Increased Yields over Check Plots.			Total Values of Increase per acre.	Profit after deducting cost of Fertilizer.
		1913. Potatoes.	1914. Grain.	1915. Hay.		
	$ cts.	Bush.	Bush.	Lb.	$ cts.	$ cts.
1	22 10	47·5	24·9	695	41 40	19 30
2	24 50	37·0	18·2	2,535	46 60	22 10
3	31 50	89·5	28·8	2,455	78 55	45 85
4	25 10	127·5	32·1	1,355	89 95	63 85
5	19 60	40·5	23·5	436	35 25	15 65
6						
7	13 60	89·5	18·2	1,815	67 54	53 85
8	20 40	105·5	31·2	2,795	89 30	68 90
9	17 60	81·0	24·1	975	59 85	42 25
10	9 80	51·0	8·5	935	36 75	27 75
11						
12	27 20	120·5	31·7	3,495	102 30	75 10
13	16 10	32·0	25·3	735	34 15	18 05
14						
15	7 50	4·5	— 2·4	3,195	25 00	17 50
16	22 10	105·0	38·8	2,995	94 35	72 25
17	5 60	18·5	0·0	1,395	19 75	14 15
18	15 00	70·5	7·1	1,615	50 90	35 90
19						
20	13 10	30·0	15·6	2,295	40 00	26 90
21	8 00	28·0	3·5	4,882	52 35	44 35
22	17 00	64·5	24·1	7,416	99 90	82 90
23	16 50	63·0	24·7	3,215	67 95	51 45
24	14 60	33·5	28·8	2,795	52 10	37 50

Note.—Plots 6, 11, 14 and 19 are check plots.

Discussion of The Profit and Loss Statement (Experiment IV).

Plot 22, which received nitrate of soda and basic slag, but no potash, shows the largest profit in the series, the abnormally heavy yield of clover (9,521 pounds per acre) being responsible for the final high standing of this plot. Unfortunately we cannot accept this result as final; it needs confirmation.

The second largest profit is credited to plot 12, which produced the most valuable increase ($102.30), but the greater cost of the fertilizer over that applied to plot 22 reduces the profit. Observe that the fertilizing of plot 12 represents the heaviest application of the same mixture (corresponding to the formula 3-5-8-6-11-5) applied twice in the rotation to plots 1, 7, 8, and 12, viz., 184·6 pounds of nitrate of soda, 430·8 pounds of acid phosphate, and 184·6 pounds of sulphate of potash, per acre.

Plot 16, yielding the third largest profit, received the same complete mixture as was applied to plot 12, except that muriate of potash replaced the sulphate of potash, and the mixture was applied at the rate of 650 pounds per acre on plot 16, as compared with 800 pounds per acre on plot 12.

Plot 8, which received the medium application of this same mixture (600 pounds per acre) appears fourth in the list of profits, while the fifth place is taken by plot 4, which produced the largest yield of potatoes in 1913. To plot 4, as was already stated, sulphate of ammonia, instead of nitrate of soda, was applied, but the greater amount of nitrogen thus furnished precludes the comparison on an equal basis of this plot with the others.

The outstanding feature of these results is the fact that in every single instance a substantial profit from the use of the fertilizer has been recorded.

Plot 15 (receiving potash alone) was the only one which failed to produce an increase over the yields of the check plots in the first two years of the rotation, but in the final year even this plot showed a profit over the cost of the fertilizer.

EXPERIMENT V[1]: SECOND CROP OF THE ROTATION: OATS, 1915.

To ascertain the relative fertilizing Value of various Sources of Nitrogen, Phosphoric Acid and Potash and, at the same Time, to determine the Influence of ground Limestone when supplied in addition to the Fertilizers.

This experiment was carried out in duplicate, one series of plots receiving limestone, at the rate of 2 tons per acre, the other being unlimed. In each series, a check plot was provided which received no fertilizer.

The plan includes six plots (in duplicate) to five of which the same quantities of nitrogen, phosphoric acid, and potash were furnished, only the sources of nitrogen and phosphoric acid were varied. The fertilizing on each of the five duplicate plots corresponds to a 4-8-10 formula.

The rotation is of three years' duration and consists of potatoes, grain and timothy, and clover, the fertilizer being applied to the first crop only.

The soil is a light loam of low fertility.

The area was reclaimed from forest in 1911 and 1912 grew a crop of buckwheat which was ploughed under. The whole area was uniformly treated to 400 pounds per acre of a 4-8-10 fertilizer mixture in 1913, a crop of corn being grown, that year, which yielded only 4 tons 100 pounds, per acre.

The experiment was commenced in 1914, so that the results from the second crop (oats) of the rotation are now recorded.

On May 20, 1915, selected Banner oats were seeded on the area at the rate of 2½ bushels per acre, a mixture of 8 pounds of red clover, 2 pounds of alsike, and 8 pounds of timothy seed being sown at the same time by the grass seed attachment of the grain drill. The growth on the various plots was short and thin but even, and all ripened at the same time. The grain was cut on September 9. The "catch" of grass and clover is poor and, except on the limed area, there is very little clover.

[1] Referred to as Experiment IV in the 1915 Report.

TABLE XII.—Experiment V at Kentville—Second Crop of Rotation: Oats. To ascertain the relative values of various Forms of Nitrogen and Phosphoric acid, in a complete Fertilizer, with and without Lime.

Plot.	Fertilizers (in pounds per acre) applied in 1914.						Yields per acre—Grain 1915.						Yields per acre—Potatoes 1914.			
							Not Limed.			Limed.			Not Limed		Limed.	
	Nitrate of Soda.	Sulphate of Ammonia.	Acid Phosphate.	Basic Slag.	Bone Meal.	Muriate of Potash.	Yield of Straw.	Yield of Grain.		Yield of Straw.	Yield of Grain.					
							Lb.	Bush.	Lb.	Lb.	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
1	140		150	150		101·2	1,970	32	22	2,200	37	32	73	35	85	52½
2		105	150	150		101·2	1,590	29	4	2,250	38	18	69	40	86	20
3	70	52·5	300			101·2	1,785	31	31	2,115	36	31	83	45	90	35
4	70	52·5		300		101·2	1,900	31	6	2,405	40	15	84	55	92	30
5	50	52·5			240	101·2	1,845	33	23	2,020	38	8	68	70	78	40
6							1,615	30	15	1,675	32	27	55	55	67	35
	Average of plots not limed but fertilized						1,818	31	24				76	13		
	Average of plots limed and fertilized									2,198	38	14			86	45

Note:—No. 6 is the Check Plot.

Where no lime was used the crop of the rotation (oats) showed but little increase in yield over that on the check plot, but with the addition of lime the after-effects of the fertilizers were distinctly noticeable. On an average, the limed plots produced 6 bushels 20 pounds of grain and 380 pounds of straw, per acre, in excess of the yields from the unlimed plots.

Without a single exception, the plots which received ground limestone produced an increase over the unlimed plots.

The fertilizer mixture which seems to have proved most effective is that applied to plot 4. Here, the phosphoric acid is solely derived from basic slag, the nitrogen in equal parts from nitrate of soda and sulphate of ammonia, and the potash from muriate of potash.

The results from the potato crop (1914) are given alongside those of the oat crop (1915) in table XII.

The experiment has clearly demonstrated the beneficial influence of liming, particularly where ground limestone was applied in addition to the fertilizer.

SEAWEED FERTILIZER EXPERIMENTS.

In the summer of 1915 an investigation was undertaken by this Division to ascertain the feasibility of preparing a nitro-potassic fertilizer by the drying and grinding of seaweeds on the Atlantic coast. At the close of the experimental operations, about 50 tons of the seaweed fertilizer had been prepared.

A few field experiments were introduced at the Eastern Stations in 1915, with a view to testing the fertilizing value of the new material. However, by the time it was available the season was so far advanced that reliable conclusions as to its influence could not be drawn, and hence it is not advisable to publish the results. This year (1916), in addition to similar experiments inaugurated at the Central Experimental Farm, Ottawa, and the branch Experimental Stations at Cap Rouge, Que., Charlottetown, P.E.I., Fredericton, N.B., Lennoxville, Que., and Kentville, N.S., nearly 100 experiments with seaweed fertilizer are being conducted by individual farmers distributed throughout the provinces of Nova Scotia, New Brunswick, Prince Edward Island, and Quebec.

Since these tests are being carried out under a variety of conditions, both of soil and climate, some interesting results are expected.

ACKNOWLEDGMENTS.

For much valuable time and care devoted to the supervision of the experiments, discussed in this report, our thanks are due to the following superintendents: Messrs. W. S. Blair, of Kentville; J. A. Clark, of Charlottetown; W. W. Hubbard, Fredericton; G. A. Langelier, Cap Rouge, and P. H. Moore, Agassiz.

To Mr. Blair we are indebted also for his valued services in supervising the distribution of the seaweed fertilizer amongst the different experimenters.

INSECTICIDES AND FUNGICIDES.

LIME-SULPHUR SPRAY.

Past reports have discussed very fully the nature of this popular spray, its home preparation and the composition of the several brands found upon the market. With respect to the latter it may be remarked that speaking generally our analyses have afforded satisfactory evidence of good quality and standard strength.

We now report on three well-known brands, the analysis being undertaken at the instance of the Dominion Fruit Commissioner:—

Laboratory No.	Brand.	Sp. Gr.	Sulphur in Solution.	
			Total.	As Sulphide.
25966	Rex Lime-sulphur, Rex Spray Co., Brighton, Ont.	1·2950	25·69	24·40
25968	Niagara Brand, Niagara Spray Co	1·2910	25·34	24·28
25969	Lime-sulphur, Grasselli Co	1·2902	25·86	24·93

The data indicate that all three brands are of good quality being free from impurity, and are practically of equal strength.

Laboratory Nos. 20868-9.—These are two samples of lime-sulphur wash from a quantity that had been frozen the previous winter. The Provincial Horticulturist for New Brunswick, who forwarded the samples, wrote as follows: "No. 1 is out of a barrel that was not opened or tapped until a few days ago (April 17, 1915) although purchased last year. No. 2 is from a barrel which was partly used last year, and of which a portion stood over during the winter."

Laboratory No.	Sp. Gravity.	Soluble Sulphur.	
		Total.	As Sulphide.
20868 (No. 1)	1·254	24·25	23·31
20869 (No. 2)	1·274	24·00	23·00

These two samples are, for practical purposes, identical.

Our examination has not revealed any injury due to freezing.

That from the opened barrel (No. 2), judging from composition and consistency, is in all probability equal in fungicidal properties to that from the unopened barrel.

LEAD ARSENATE.

At the instance of the Dominion Fruit Commissioner we have submitted to analysis three brands of this insecticide, and obtained the following results:—

Laboratory No.	Brand.	Water.	Total arsenic oxide.	Total lead oxide.	Soluble arsenic oxide.	Total soluble solids.
		p.c.	p.c.	p.c.	p.c.	p.c.
25967	Rex. Rex Spray Co., Brighton	44·88	16·29	36·35	1·6	4·4
25970	Niagara Brand. Niagara Brand Spray Co	47·47	16·54	34·05	0·6	3·0
25971	Grasselli Brand. Grasselli Co	48·21	15·83	34·42	0·45	2·5

All three brands meet the generally accepted requirements of this insecticide, but the Rex brand contains slightly more soluble arsenic oxide than is desirable.

Laboratory No. 20941.—Regarding this sample of arsenate of lead, the Provincial Horticulturist of New Brunswick wrote as follows: "The accompanying sample is from a 50-pound keg of paste arsenate of lead which was left in a shed all winter and which when opened recently was a solid mass, covered with ice. Do you consider that this freezing and separation has made the material useless for spraying purposes?"

As received, this arsenate of lead was quite dry. To ascertain if this material had lost its quality of remaining in suspension, or been otherwise physically affected, two samples of 5 grammes each were taken. One was ground *dry*, the other ground to a paste with water. Each was then stirred with 500 cc. of water and allowed to stand; the rates of settling were practically equal.

The freezing and separation could not affect the composition of the arsenate of lead, that is, the toxic value of the material could not be impaired. From the laboratory experiments it would seem that the conditions to which it had been exposed had not markedly impaired its adhesive properties, nevertheless we think the better plan would be to first work up the dried arsenate with a little water to a smooth paste before adding it to the total volume of the spray.

ARSENATE OF LIME (CALCIUM ARSENATE).

Laboratory No. 21039.—The sample here reported on was submitted by the Dominion Entomologist, who stated that it had been made according to the following formula:—

Lime	pounds.	5
Sodium arsenate	"	10
Water	gallons.	20

Its analysis afforded the following data:—

	Per Cent.
Water	48·7
Total arsenic as arsenic oxide	11·8
Water soluble arsenic as arsenic oxide	0·28

Pure, anhydrous, calcium arsenate (arsenate of lime) contains 57·8 per cent of arsenic oxide. The present sample contains, in the dry state, 23 per cent arsenic oxide. From these figures its toxic value, as compared with that of pure calcium arsenate, may be compared.

The percentage of water soluble arsenic—a matter of very considerable importance from the standpoint of possible injury to foliage—is well within the limits of safety.

Laboratory No. 20807.—This sample of calcium arsenate was received for co-operative analytical work from the Association of Official Agricultural Chemists, Washington, D.C. It was found to contain 57·75 per cent of arsenic in the form of arsenic oxide, so that the compound was practically pure calcium arsenate.

ZINC ARSENITE.

Laboratory No. 20808.—This sample of zinc arsenite—a newly proposed arsenical insecticide—was also submitted for analysis by the Association of Official Agricultural Chemists. Our results are as follows:—

	Per Cent.
Arsenious oxide	42·05
Arsenic oxide	0·48
Zinc oxide	54·76

POTASSIUM CYANIDE.

Laboratory No. 20047.—This sample labelled "Potassium Cyanide White Cake," May and Baker, Limited, was examined at the request of the Horticultural Division. Its use for the fumigation of green-houses employing the amount per 1,000 cubic feet called for in the formula had been attended with unsatisfactory results.

It was found on analysis to contain 30·46 per cent potassium cyanide, practically one-third the strength of high-grade cyanide (98 to 100 per cent). In this fact we have an explanation for the failure referred to.

Inquiries sent to the wholesale drug trade as to the various brands of cyanide on the market have elicited the information that there are several grades or qualities for sale. With the low grades (as the one now reported on) larger quantities will be required than are called for by the formula. For effective work we believe it will be advantageous when ordering to stipulate the high-grade cyanide (98 to 100 per cent), and further if possible, to obtain it in unopened containers as put up by the wholesale druggists.

TOBACCO EXTRACTS.

As a contact insecticide, especially for the control of aphids, tobacco decoctions possess a high value. It is generally considered that the percentage of nicotine present in a decoction marks its insecticidal value, though there is certain evidence to indicate that other constituents of the tobacco also take a part in its effect as a contact spray.

The following samples were submitted by the Dominion Entomologist, who stated the decoctions represented were being used in experimental work in control of aphids.

Laboratory Nos. 21177-8-9.—Formula: One pound of tobacco to two gallons of water:—

	Nicotine Per Cent.
No. 1 Steeped in cold water for two days	0·14
" 2 Made with hot water and steeped over night	0·13
" 3 Prepared by bringing the tobacco water to the boiling point with steam	0·15

It would seem as regards nicotine content of the extract or decoction, all three methods of preparation gave practically the same result.

Four further samples were sent in for determination of nicotine content by the Dominion Entomologist. These were made from the cured foliage of White Burley tobacco, as follows:—

	Nicotine Per cent.
Laboratory No. 25126: (No. 1)—	
1 pound foliage to 1 gallon water—steeped in cold water 48 hours	0·141
Laboratory No. 25127 (No. 2)—	
1 pound foliage to 1 gallon water—steeped in hot water and left in water 48 hours	0·113
Laboratory No. 25128 (No. 3)—	
1 pound foliage to 2 gallons water—steeped in hot water and left in water for 48 hours	0·070
Laboratory No. 25129 (No. 4)—	
1 pound foliage to 2 gallons water—steeped in cold water for 48 hours.	0·038

From the results of Nos. 1 and 2 we might conclude that cold water is at least equally effective with hot in extracting the nicotine, but the data of Nos. 3 and 4 do not confirm this deduction, and further experimental work will be necessary in connection with this investigation.

Laboratory No. 17621.—"Black Leaf Forty." A well-known tobacco preparation used as an insecticide for the control of aphids, manufactured by the Kentucky Tobacco Products Co. It is a heavy dark-coloured, viscous fluid.

A sample submitted by the Division of Horticulture was found to contain 34·41 per cent of nicotine. As the directions for use read 1 teaspoonful to 1 gallon of water, the prepared spray would contain 0·027 per cent of nicotine.

SAPHO INSECTICIDE.

Laboratory No. 17620.—This is a sherry coloured, limpid liquid advertised as a contact insecticide for the control of aphids, etc. The sample analysed had been received from England, with a request that its practical value in Canada might be ascertained.

	Per Cent.
Specific gravity	·8307
Naphthalene oils, approximately	98·0
Phenols approximately	2·0

The Horticultural Division reported that this material was too high priced to permit it coming into successful competition with the various well-known and effective sprays in use.

GOPHERCIDES.

As long ago as 1894 we called attention in the report of this Division to the value of strychnine as a gopher poison, giving directions for preparing the poisoned bait (wheat), and its use in the field and garden.

Every year we receive a number of samples of crystalline strychnine and strychnine sulphate from municipalities and individual farmers for examination and invariably we find them genuine and of good quality. Occasionally the poison is forwarded to us in the fluid form—as sold for gopher extermination—in which case the amount of strychnine per fluid ounce is determined.

The analyses of prepared gopher poisons—as found on the market in Northwestern Canada—and examined during the year may be reported as follows:—

Laboratory No. 22796.—"Government Standard Gopher Poison" National Drug and Chemical Co. of Canada, Winnipeg, Man. The directions read: "Add the contents of this bottle to a gallon of water and soak as much wheat as will absorb the solution."

The bottle contained 3·61 fluid ounces of a greenish blue fluid, smelling strongly of acetic acid. The alkaloid is present as sulphate, and a determination of the amount shows 11·62 grains of crystallized strychnine sulphate per fluid ounce. The bottle would therefore contain 41·95 grains of strychnine sulphate.

Laboratory No. 20938.—A second sample of similar size of "Government Standard," but prepared by the Bole Drug Company, Winnipeg, Man., was found to contain 12·63 grains of crystallized sulphate of strychnine per fluid ounce. The directions are verbatim with those given on the label of No. 22796.

Laboratory No. 25593.—A third sample of similar size of "Government Standard" also prepared by the Bole Drug Company, Winnipeg, Man., gave 6·96 grains of crystallized sulphate of strychnine per fluid ounce. The directions on the label read "Add the contents of this bottle to half a gallon of water and soak as much wheat as will absorb the solution."

Laboratory No. 25490.—"Mickelson's Kill-Em-Quick Gopher Poison," Winnipeg, Man. This is in the form of a dry powder, of a light cream colour, not unlike flour. The package contains 10 ounces of the preparation. The marked price is 75 cents.

Its analysis showed it to contain 1·368 per cent strychnine, equivalent to 1·74 per cent crystallized strychnine sulphate.

Laboratory No. 25491.—"Gophercide," manufactured by the National Drug and Chemical Company of Canada, Montreal. This preparation is in the form of a white powder, the package containing 1 ounce. The price marked on the package is 50 cents.

The data for the ninth year of this inquiry (March 1, 1915, to February 29, 1916) crystallized strychnine sulphate.

Laboratory No. 25492.—"Bolduan's Poisoned Grain," Bolduan Manufacturing Company, Limited, Indian Head, Sask. The package contains 25 ounces, the price of which is marked 50 cents.

As the name indicates, this preparation is grain (unground wheat) containing the poison. Its analysis indicated 0·311 per cent strychnine, equivalent to 0·39 per cent of crystallized strychnine sulphate.

Laboratory No. 25834.—"My Own Gopher Poison," manufactured by the Mickelson Drug and Chemical Company, Limited, Winnipeg, Man. A dry, pinkish powder containing 1·046 per cent of strychnine, equivalent to 1·33 per cent of crystallized strychnine sulphate. The package contains 6 ounces of the preparation, and the marked price is 50 cents.

Laboratory No. 25835.—"Rodo, the Gopher Killer," manufactured by the Prairie Chemical Company, Winnipeg, Man. A pinkish red powder containing 0·913 per cent of strychnine, equivalent to 1·16 per cent of crystallized strychnine sulphate.

The package contains 5 ounces, and the marked price is 25 cents.

Inquiries among those who have had experience in gopher poisoning elicit the information that the several preparations on the market for the destruction of these pests are being discarded in favour of the home-prepared bait, using strychnine or strychnine sulphate as the poison. It is held that the bait so prepared is cheaper than the purchased preparations.

General directions for the preparation of the poisoned wheat may be given as follows: "Dissolve 1 ounce of strychnine or of strychnine sulphate (both are crystalline solids and equally poisonous, but the sulphate is the more soluble) in from one to two pints of vinegar to which has been added an equal volume of hot water. Stir till all the strychnine is in solution, adding more water, and boiling if necessary. Add to this solution of strychnine 1 pint of molasses or 1 pound of sugar and a teaspoonful of oil of anise seed. Pour this hot solution over 50 or 60 pounds of wheat and stir till every grain is thoroughly moistened. (If necessary, a further quantity of water should be added at this stage, so that the poisonous solution may be amply sufficient to completely wet every kernel.) Allow the grain to remain in the vessel twenty-four hours to absorb the solution. If at the end of this period the liquid is not entirely taken up by the wheat, add a pound or two of shorts or flour and stir well. It is best to use this poisoned wheat while still moist: a small teaspoonful will be sufficient for each gopher hole.

Caution:—Strychnine and strychnine sulphate are among the most deadly of all known poisons. The greatest care therefore should be exercised in preparing the grain and in its use, in order that accident to farm animals, children, and others may be prevented.

We think it particularly desirable to start the work of poisoning very early in the spring, as it is more or less difficult to get the gophers to take the grain once fresh vegetable matter is obtainable.

THE FERTILIZING VALUE OF RAIN AND SNOW.

This investigation, commenced in 1903, has for its object the determination of the nitrogen compounds in the rain and snow, and hence the possible enrichment of the soil, per acre, from these sources.

The samples for analysis were collected at the Central Experimental Farm, situated on the outskirts of Ottawa, every fall of rain and snow that would yield a sufficiency for analysis from the catchment area employed being examined.

The data for the ninth year of this inquiry (March 1, 1915, to February 29, 1916) are now recorded and discussed.

The total precipitation (rain and snow) was 33·65 inches, an amount which exceeds the precipitation of the previous year by 8·31 inches, but which is practically equal to the average for the past twenty-four years at Ottawa, viz., 33·96 inches.

The rainfall was 23·13 inches, which the records show to be 6·43 inches more than in the previous experimental year 1914-15 (an exceptionally dry season), but differing little from the average obtained for the previous twenty-four years, viz., 24·37 inches. In March and April the precipitation was light; in May, June, and July the showers were moderate and fairly well distributed to meet crop needs; in August the rainfall was much above the normal, with 7·09 inches; September with 2·87 inches, and October with 1·30 inches, call for no special comment.

The snowfall was 105·25 inches (equivalent to 10·52 inches in rain), 19 inches more than in the winter season of 1914-15, and 13·46 inches higher than the average for the previous twenty-four years.

During the twelve-month experimental period, seventy-six samples were analysed: fifty-four of rain and twenty-two of snow.

Table I presents the monthly totals of precipitation, the monthly average nitrogen-content of the precipitation in parts per million and the pounds of nitrogen per acre furnished monthly by the precipitation.

TABLE I.—Rain and Snow at Ottawa, Ont., for the Year ending February 29, 1916.

Month and Year.	Precipitation in Inches.			Nitrogen.				Pounds of Nitrogen per acre.
	Rain.	Snow.	Total in Inches of Rain.	In Free Ammonia.	In Albuminoid Ammonia.	In Nitrates and Nitrites	Total.	
1915.				p.p.m.	p.p.m.	p.p.m.	p.p.m.	
March	0·47	2·00	0·67	0·259	2·306	2·760	5·319	0·807
April	0·99	...	0·99	1·182	0·808	0·753	2·743	0·615
May	1·86	...	1·86	0·218	0·167	0·240	0·625	0·264
June	2·94	...	2·94	0·270	0·038	0·198	0·506	0·335
July	2·12	...	2·12	0·424	0·077	0·935	1·436	0·690
August	7·09	...	7·09	0·315	0·315	1·995	2·625	4·216
September	2·87	...	2·87	0·393	0·156	0·092	0·641	0·417
October	1·30	...	1·30	0·651	0·051	0·600	1·302	0·384
November	1·11	0·50	1·16	0·258	0·403	0·477	1·138	0·299
December	0·36	38·50	4·21	0·402	0·236	0·258	0·896	0·855
1916.								
January	2·02	21·75	4·195	0·141	0·178	0·144	0·463	0·440
February	...	42·50	4·250	0·222	0·150	0·084	0·456	0·443
Total for 12 months	23·13	105·25	33·655	...	...	...	...	9·765

Reference has already been made to the chief features in connection with the precipitation of the year, its amount and distribution; it only remains in this connection to point out that the amount, 33·65 inches, but very slightly exceeded the average annual precipitation of the nine years during which the investigation has been in progress, and which table II shows to be 32·81 inches.

The total nitrogen for the year amounted to 9·765 pounds per acre—an amount very considerably larger than that obtained in any previous year of this examination. This excess—if such it may be regarded—cannot be altogether accounted for by a larger rainfall; for in three years of the investigation (1907-8, 1909-10, 1912-13) the precipitation exceeded somewhat that now recorded, while the nitrogen obtained was

very considerably less. Nor can it be ascribed to many or severe storms; in this respect the summer of 1915 was not abnormal. If the cause is to be found in any exceptional or unusual meteorological condition of the atmosphere, we have not yet been successful in discovering it, though the matter has had our careful study. The pollution of the atmosphere by fumes and smoke from the factories in Ottawa and the adjoining city of Hull offers a possible explanation, especially when northerly winds have prevailed prior to or during a precipitation. The air of Ottawa and over the Central Experimental Farm is occasionally rendered notably nauseating and almost stifling by fumes, presumably from a pulp mill across the Ottawa river and opposite the city, and it would seem only reasonable to suppose that rain falling at such times would wash out of the atmosphere much that would affect the analysis. We have not been able in all instances to correlate this occasionally polluted condition of the air with a high nitrogen content of the rain, and therefore do not at present assign it as the cause, or, at all events, the sole cause. The matter is now under more strict observation and study, and it is hoped a satisfactory explanation for this apparently phenomenal condition may be obtained during the coming year.

TABLE II.—Precipitation and Amount of Nitrogen, per Acre, Ottawa, Ont. 1908-16.

Year.	Rain in inches.	Snow in inches.	Total Precipitation in inches of rain.	Pounds of nitrogen per acre.
Year ending February 29, 1908	24·05	133·0	37·35	4·322
" " 28, 1909	22·99	96·25	32·63	8·364
" " 28, 1910	28·79	80·75	36·87	6·869
" " 28, 1911	19·67	73·00	26·97	5·271
" " 29, 1912	20·33	104·25	30·76	6·100
" " 28, 1913	30·34	96·25	39·96	6·144
" " 28, 1914	23·31	84·75	31·78	6·208
" " 28, 1915	16·70	86·25	25·34	4·905
" " 29, 1916	23·13	105·25	33·65	9·765
Average for 25 years	24·32	92·33	33·55	
Average for 9 years	23·26	95·53	32·81	6·438

Table II summarizes the more important data of the investigation since its institution. The precipitation data, it will be observed, show that for the year ending February 29, 1916, the rainfall was practically identical with the average for the nine years of the investigation, and that the total precipitation for the year (33·65 inches) but slightly exceed that of the average (32·81 inches). The snowfall was somewhat above the average, but with this exception the year's figures do not present any feature of particular interest.

In the amount of nitrogen furnished per acre, the figures for the past year, as already remarked, are exceptionally high. During the whole period of the investigation, in one year only has the total nitrogen approached the results of last season. This was in the summer of 1908, when extensive bush fires in the Ottawa Valley district and adjacent territories abnormally enriched the rain in ammonia.

TABLE III.—Amounts of Nitrogen furnished by Rain and Snow, 1908-16.

Year.	Total.	By Rain.		By Snow.	
		Pounds.	Proportion.	Pounds.	Proportion.
	Lb.		p.c		p.c.
Year ending February 29, 1908	4·322	3·243	75	1·080	25*
" " 28, 1909	8·364	7·528	90**	0·836	10
" " 28, 1910	6·869	5·830	85	1·040	15
" " 28, 1911	5·271	4·424	84	0·847	16
" " 29, 1912	6·100	5·075	83	1·025	17
" " 28, 1913	6·144	5·113	83	1·031	17
" " 28, 1914	6·208	5·192	84	1·016	16
" " 28, 1915	4·905	3·976	81	0·929	19
" " 29, 1916	9·765	8·065	83	1·700	17

*Snowfall exceptionally heavy.
**Rain abnormally rich in ammonia due to bush fires.

The data of table III are of interest in showing at a glance the proportions of the total nitrogen furnished by the rain and snow, respectively. The results for the past year, in this particular, conform very closely to those hitherto obtained, and indicate that about 83 per cent was found in the rain and 17 per cent in the snow. The rain furnished 8·065 pounds and the snow 1·7 pound per acre.

TABLE IV.—Average Nitrogen-content of Rain and Snow.

Amount of Nitrogen per Acre as Free and Albuminoid Ammonia and as Nitrates and Nitrites, 1915-16.

	Number of Samples Analysed.	Precipitation in Inches.	Nitrogen.								
			Parts per Million.				Percentage of Total.			Pounds per Acre.	
			In Free Ammonia.	In Albuminoid Ammonia.	In Nitrates and Nitrites.	Total.	In Free Ammonia.	In Albuminoid Ammonia.	In Nitrates and Nitrites.	As Free and Albuminoid Ammonia	As Nitrates and Nitrites.
Rain	54	23·13	0·390	0·319	0·830	1·539	25	21	54	3·715	4·350
Snow	22	105·25	0·243	0·242	0·228	0·713	34	34	32	1·155	0·545

From the data of table IV we learn that rain is decidedly richer than snow in all the nitrogen compounds. This is in full accord with the findings of previous years. The results of the past year, however, differ from preceding data of a similar character in showing a much higher percentage of nitrogen present in the form of nitrates and nitrites. For several years past this tendency for the rain to become richer in nitric nitrogen has been observed.

While the snow of the past winter was decidedly richer in all the nitrogen compounds than has been before remarked, we do not find the extraordinary proportion of nitric nitrogen, which characterizes the season's rain.

Of the total nitrogen, 9·765 pounds per acre, this table shows that 4·870 pounds occurred as free and organic ammonia, and 4·895 pounds as nitrates and nitrites.

MISCELLANEOUS.

SASKATCHEWAN CREAMERY BUTTER.

In March of the present year (1916) we received a request from the Dairy Commissioner, Department of Agriculture, Regina, for the analyses of a series of butters made in the creameries of the province of Saskatchewan, the object of the examination being to ascertain if the product would meet with the requirements of the Australian market. It was stated that the import regulations of Australia are very strict and provide that butter shall contain at least 82 per cent of butter-fat.

The analyses of the series, consisting of thirteen samples, afforded the following data, all of which may be considered as decidedly satisfactory:—

Laboratory No.	Identification.	Water.	Fat.	Curd and salt by difference.
25805	D 275	8·98	87·20	3·82
25806	D 240	12·66	82·53	4·81
25807	H 208	11·56	83·85	4·59
25808	E 138	11·51	83·40	5·09
25809	F 201	10·63	84·12	5·25
25810	N 141	11·25	83·69	5·06
25811	K 149	11·14	85·00	3·86
25812	M 115	11·10	86·52	2·38
25813	A 543	11·78	83·20	5·02
25814	R 191	11·41	83·46	5·13
25815	B 89	12·50	83·80	3·70
25816	O 236	10·54	84·98	4·48
25817	G 494	9·52	86·10	4·38

POULTRY GRIT.

Laboratory No. 25009.—This is a sample of naturally-occurring "grit" being used in the poultry yards of the Experimental Station, Invermere, B.C. It was procured by the Superintendent of the Station from one of the copper mines in the Columbia valley. He writes: "It is apparently giving good results and we should like to recommend it to the farmers in the vicinity because of its cheapness and the fact that it can be obtained almost at their doors. Before doing this, however, I should like to get a chemical analysis of the sample submitted."

It consists of a mixture of small particles or fragments of quartz and quartzite in nearly equal proportions, with a few pieces of feldspar and a small proportion of carbonate of lime. These rock fragments are angular but the edges are not so sharp.

Mechanical analysis.

	Per Cent.
Passes 60 mesh screen	0·3
" 20 "	2·2
" 10 "	20·5
Remains on 10 mesh screen	79·5

The larger number of fragments would probably be between one-eighth and one-quarter inch in their greatest dimension.

Chemical analysis.

	Per Cent.
Mineral matter insoluble in acid	77·28
Oxide of iron and alumina	4·16
Carbonate of lime	10·62
" magnesia	7·26
Phosphoric acid	Trace.
Oxide of copper	0·24

We are of the opinion that from the standpoint of composition as well as that of size, this material should prove a suitable and useful "grit" for poultry. We do not think the small amount of copper would have any deleterious effect on the health of the birds or on the quality of the eggs from laying stock.

There is no doubt in many districts material that could similarly be used as poultry grit.

EGG PRESERVATIVE.

Laboratory No. 21110.—For many years past the Division of Chemistry has analysed and made practical trials with egg preservatives, as advertised or put upon the market. During the course of this work preparations from many parts of the world, and submitted to us for trial and report, have been examined, the results, in so far as they might be of interest to the public, appearing in the annual report.

In May, 1915, we received from the manufacturers a small supply of Keep's Egg Preservative (London, England), with a request that we use it in a practical test, comparing it with saturated lime water—the preservative that we have advocated for household use for a number of years.

"Keep's Egg Preservative" is a dry powder, which on analysis was found to have the following composition:—

	Per Cent.
Borax ($Na_2B_4O_7 + 10H_2O$)	62·08
Boracic acid (H_3BO_3)	38·22

The directions read as follows: "For each gallon of water add two ounces of pure quicklime. The following day add five ounces of Keep's Egg Preservative, stir well and allowed to stand over night, then give another stir and the solution is ready. The eggs may then be gently floated into the solution, allowing 3 or 4 inches of the fluid to cover them, to compensate for loss by evaporation of the water while standing."

On June 2, 1915, six fresh unfertilized eggs were placed in "Keep's Egg Preservative," made as directed and six similar eggs put in saturated lime water. The containers were wide-mouth glass-stoppered bottles. Storage was in a cellar not rising above 65° F. in summer. These eggs were examined carefully on March 17, 1916, when the following notes were made:—

Keep's Preservative.	Saturated lime water.
White.—Very slightly discoloured and somewhat limpid, compared with that of fresh eggs. No disagreeable odour.	Very slightly discoloured and somewhat limpi,p compared with that of fresh eggs. No disagreeable odour.
Yolk.—Fairly globular and normal except that integument was very tender.	Fairly globular and normal except that integument was very tender.

It will be observed that there was practically no difference, externally or on opening and exposing the contents, between the two lots of eggs, all of which, at the date examined, were found to be quite sound and usable for cooking purposes.

WELL WATERS FROM FARM HOMESTEADS.

The varied character of the work of the Division of Chemistry, touching at some point almost every phase of Canadian agriculture, will be apparent from a perusal of the annual reports of the Division. Of the features of that work which appeal more directly to the individual farmer, the examination of well waters is perhaps the one that attracts the widest interest; it is certainly one that is receiving an ever-increasing appreciation throughout the country. It is one, we believe, that is gradually but surely exerting a beneficial influence, bringing home to the farmer the importance and the value of pure water and, on the other hand, the menace to health of a polluted supply. Water is as necessary as food for the maintenance of life, and pure water is essential to good health and thrift, in both man and beast.

An examination of Canadian waters extending over a period of thirty years indicates that there are two chief classes of waters that are to be regarded as unwholesome and unsuitable for domestic or stock use—waters containing drainage matter of an excretal character, and waters that are heavily charged with saline matter.

With respect to the former, our work has shown that the pollution is due in the majority of cases to locating the well improperly—as in the barnyard or under the barn or stable, or not far from the privy (frequently a very unsanitary affair); sooner or later such wells will assuredly be contaminated and dangerous to use. We therefore strongly counsel those about to sink a well—and especially a shallow well—to bear in mind that convenience should not be a primary consideration. If at all possible, let the location be one that is beyond reproach from the sanitary standpoint. Secondly, the surrounding area, say for a radius of 50 yards, should be kept free from manure and filth; it may preferably be kept in sod. Provision should be made to carry off surplus water from pumping to a safe distance. Wells may be readily polluted by soakage and drainage arising from the washing of milk pails, etc., at the well and we strongly discourage the practice, as also that of using the well as a cold storage.

A precaution against local pollution of very considerable value is to line the well to a depth of 10 to 12 feet and to a thickness of 6 inches, with concrete or puddled clay, allowing this wall or lining to project say 12 inches above the mouth of the well. This will prevent the direct inflow of surface wash, keep out rats, frogs, etc., and, in all probability, ensure a certain filtration through clean soil of the water entering the well from the immediate surroundings. The well should be furnished with a sound, tight, and well-fitting cover.

If a water is offensive to sight, smell, or taste, it is, in all probability, unsafe, or at least highly objectionable for domestic use. But, it must be remembered, there are many clear cool sparkling waters, unobjectionable to sight or smell, that are dangerously polluted. If the farmer has any reason to doubt the wholesomeness of his supply, he should have a sample submitted to analysis. Well waters from farm homesteads are analysed free of charge, in the laboratories of the Experimental Farms, provided that the samples are collected and forwarded in accordance with instructions which may be obtained on application from the Division of Chemistry, Central Experimental Farm, Ottawa.

In cases of doubtful purity and until such times as a more satisfactory supply can be obtained, one or other of the following safeguards should be adopted: (1) boil all waters required for drinking and culinary use, or (2) sterilize such water by the use of chloride of lime, employed by rubbing up half a teaspoonful of this chemical with a little water and stirring the thin paste so formed into a barrel of water. Both of these precautionary methods are valuable for the destruction of any disease germs that may be present, but neither of them removes the excretal products from drainage pollution, and therefore they cannot make such contaminated waters good or desirable.

But with all these safeguards and precautionary methods, the shallow well is not to be advised; unless properly located and very carefully guarded it may become at any time a source of danger. Experience has shown that the safest supply is the deep-

seated source. The bored or drilled well, tapping a deep-seated source and so located as to be beyond the possibility of contamination is the safest supply. In the survey of the farm, preparatory to locating the site of such a well, it is desirable to have in mind the practicability of piping the water to the house and farm buildings.

Reference has been made to waters unfit for domestic use by reason of their high saline (mineral) content. Waters of this character (sometimes referred to locally as "alkali waters") are more commonly met with in certain districts of sparse and irregular precipitation in the Northwest, but also occasionally occur in other parts of the Dominion. Such waters vary greatly; some may be considered as merely non-potable, by reason of their disagreeable taste, while others undoubtedly are deleterious to health if continuously used. Many of these saline waters are very bitter and extremely laxative, attributable to the presence in comparatively large amounts of sulphate of soda and sulphate of magnesia.

No method of filtration or precipitation is practicable for the purification of these waters; distillation must be resorted to, if a supply free from soluble saline matter is to be obtained. For this purpose we recommend a domestic or household still which can be operated on the kitchen stove. Several of these are on the market, at prices from $10 to $20 apiece, according to size, construction, and material. The more commonly used sizes will yield from 1 to 2 quarts per hour, a sufficiency, in most households, to supply all the water needed for drinking and culinary purposes. It is required that users of such domestic stills should register the same with the nearest Excise office; no fee is charged for registration.

In the accompanying table we present the analytical data obtained from the examination of water samples sent in during the year; there is also appended a brief report as to the quality of the waters. In reporting to the sender of the sample, a fuller and more detailed account is given, explaining the nature of the pollution (where such has been found) and the possibilities of purification. Classifying our reports on these waters we find that 22 per cent were pronounced as pure and wholesome, 24 per cent suspicious and probably dangerous, 32 per cent as seriously polluted, and 22 per cent as too saline to be potable.

Every year the Division receives a large number of water samples upon which it is impossible, owing to insufficient quantity, dirty containers, etc., to make any satisfactory analysis. To obviate disappointment in this matter, the application form issued by the Division should be obtained; it gives full information as to quantity of water required, method of collection, shipment, etc. Analysis of samples cannot be undertaken unless they are forwarded with these instructions.

ANALYSIS of Well Waters, 1915-1916—Results stated in Parts per Million.

No.	Locality.	Marks.	Date.	Free Ammonia.	Albuminoid Ammonia.	Nitrogen in Nitrates and Nitrites	Chlorine.	Total Solids at 105° C.	Solids after Ignition	Loss on Ignition	Report.
1	Basswood, Man.	D.G.	26-4-15	.....	.....	.....	7·6	2530·0	2004·0	526·0	Decidedly saline.
2	Fort Qu'Appelle, Sask.	D.H.Mc.	28-4-15	.....	.....	.....	36·6	802·0	528·0	274·0	Suspicious.
3	Ellwood, Ont.	G.Mc.	29-4-15	17·79	12·00	9·141	340·0	3776·0	2926·0	850·0	Seriously contaminated.
4	O'Leary, P.E.I.	A.T.M.	10-5-15	0·03	0·04	0·58	8·4	156·0	98·0	58·0	Wholesome.
5	O'Leary, P.E.I.	A.T.M.	10-5-15	0·02	0·05	2·4	52·5	446·0	248·0	198·0	Suspicious.
6	O'Leary, P.E.I.	A.S.P.	10-5-15	0·04	0·02	0·066	18·5	280·0	162·0	118·0	Suspicious.
7	Killam, Alberta.	L.A.M.	11-5-15	.....	.....	.....	16·6	1344·0	1166·0	178·0	Saline.
8	Chesterville, Ont.	W.B.L.	13-5-15	0·08	0·04	0·48	39·3	496·0	308·0	188·0	Suspicious.
9	Dorchester, N.B.	G.B.B.	20-5-15	0·03	0·09	0·70	178·9	576·0	336·0	240·0	Probably dangerous.
10	Rearville, Alberta.	E.C.B.	29-5-15	2·68	0·26	0·066	64·9	4450·0	3474·0	976·0	Strongly saline.
11	St. George, N.B.	J.D.W.	31-5-15	0·04	0·17	7·12	20·1	168·0	54·0	114·0	Suspicious.
12	Hintonburg, Ont.	G.E.A.	4-6-15	0·82	0·18	0·016	2·9	340·0	290·0	50·0	Polluted.
13	Chatham, N.B.	D.Mac.	4-6-15	0·05	0·03	0·60	3·5	30·0	10·0	20·0	Pure and wholesome.
14	Chatham, N.B.	D.Mac.	4-6-15	.....	.....	.....	1·8	48·0	12·0	36·0	Probably wholesome.
15	Bloomfield, N.B.	W.D.H.	7-6-15	0·02	0·11	1·32	8·0	174·0	112·0	62·0	Wholesome.
16	Bloomfield, N.B.	G.R.	7-6-15	0·06	0·12	4·415	8·8	288·0	118·0	170·0	Suspicious.
17	Theresa, Sask.	D.M.	9-6-15	2·88	0·04	1·23	56·9	6842·0	6536·0	306·0	Strongly saline.
18	Upper Woodstock, N.B.	T.H.	9-6-15	0·76	0·18	2·8	10·8	208·0	44·0	164·0	Seriously contaminated.
19	St. Bruno, P.Q.	A.B.	9-6-15	0·37	0·04	0·058	4·4	468·0	356·0	112·0	Suspicious.
20	Yeoford, Alberta.	O.C.O.	9-6-15	0·19	0·11	Free.	1·2	536·0	500·0	36·0	Free from organic pollution.
21	Pouce Coupe, B.C.	E.L.H.	10-6-15	3·56	0·10	0·091	6·7	4652·0	3312·0	1340·0	Strongly saline.
22	Clarenceville, P.Q.	E.S.R.	11-6-15	0·09	0·39	2·71	33·6	608·0	296·0	312·0	Seriously polluted.
23	Westboro, Ont.	A.C.W.	18-6-15	0·12	0·14	0·394	2·7	200·0	118·0	82·0	Contaminated.
24	Westboro, Ont.	A.C.W.	18-6-15	0·04	0·04	1·34	2·9	230·0	158·0	72·0	Suspicious.
25	Chesterville, Ont.	W.B.L.	23-6-15	0·04	0·09	10·3	32·6	628·0	352·0	276·0	Polluted.
26	Trenton, Ont.	A.W.L.	24-6-15	3·02	0·22	1·16	85·8	650·0	336·0	314·0	Seriously polluted
27	Athabasca, Alberta.	W.A.P.	25-6-15	.....	.....	.....	.....	1216·0	432·0	784·0	
28	Winchester, Ont.	A.S.	2-7-15	0·08	0·02	0·099	66·3	694·0	448·0	246·0	Polluted.
29	Forester's Falls, Ont.	J.E.P.	7-7-15	5·79	0·18	Free.	5805·0	12248·0	9974·0	2274·0	Strongly saline.
30	Killarney, Man.	J.K.	12-7-15	0·08	0·34	14·3	194·8	3588·0	2152·0	1436·0	Strongly saline.
31	Hampton, Ont.	H.B.W.	12-7-15	0·26	0·08	Free.	13·2	202·0	144·0	58·0	Contaminated.
32	Ottawa South, Ont.	A.S.	16-7-15	0·08	0·18	2·73	4·8	286·0	210·0	76·0	Suspicious.
33	Ottawa South, Ont.	D.E.S.	16-7-15	0·08	0·04	3·16	5·6	286·0	268·0	18·0	Suspicious.
34	Port Sydney, Ont.	A.G.Mac.	19-7-15	0·44	0·08	0·59	0·7	44·0	32·0	12·0	Polluted.
35	Port Sydney, Ont.	A.G.Mac.	19-7-15	0·02	0·02	5·82	15·8	212·0	106·0	106·0	Polluted.
36	Port Sydney, Ont.	H.R.B.	19-7-15	0·04	0·11	4·76	7·6	138·0	66·0	72·0	Suspicious.
37	St. Martins, N.B.	L.H.V.	19-7-15	0·50	0·18	1·45	5·8	204·0	72·0	132·0	Polluted.
38	Fredericton, N.B.	W.W.H.	19-7-15	0·14	0·06	0·72	1340·0	2562·0	2440·0	122·0	

39	Fredericton, N.B.	W.W.H.	19–7–15	0·20	0·09	0·33	1340·0	.....	.....	.....	
40	Port Sydney, Ont.	M.Mc.	19–7–15	0·02	0·35	0·35	1·8	206·0	50·0	156·0	Contaminated.
41	Chatham, Ont.	J.S.	19–7–15	0·09	0·06	6·32	33·6	452·0	346·0	106·0	Polluted.
42	Springwater, Sask.	B.T.S.	23–7–15	0·04	0·17	0·361	11·8	1556·0	1204·0	352·0	Saline.
43	Napanee, Ont.	N.Y.	29–7–15	0·37	0·13	0·404	10·8	310·0	178·0	132·0	Contaminated.
44	Newmarket, Ont.	G.A.B.	29–7–15	0·39	0·04	0·305	27·4	276·0	226·0	50·0	Wholesome.
45	Minitano, Man.	J.M.S.	30–7–15	0·55	0·16	0·57	43·2	5140·0	366·0	1480·0	Strongly saline.
46	Billings Bridge, Ont.	H.M.	30–7–15	0·48	0·08	0·21	37·0	474·0	336·0	138·0	Suspicious.
47	Milden, Sask.	J.H.	30–7–15	0·99	0·17	0·98	32·3	2544·0	2080·0	464·0	Contaminated.
48	Poronal, P.E.I.	S.J.	31–7–15	0·08	0·08	21·95	132·9	724·0	452·0	272·0	
49	Ashton Station, Ont.	D.W.	31–7–15	0·90	0·13	Free.	9·1	648·0	484·0	164·0	Contaminated.
50	Viscount, Sask.	W.B.T.	3–8–15	3·22	0·22	3·51	231·0	4532·0	4216·0	316·0	Strongly saline.
51	Toronto, Ont.	R.J.F.	5–8–15	0·56	0·27	2·06	7·1	248·0	148·0	100·0	Contaminated.
52	Kingsville, Ont.	S.C.S.	5–8–15	0·16	0·04	0·53	6·3	330·0	208·0	122·0	Dangerous.
53	Briererest, Sask.	C.C.W.	5–8–15	0·10	0·05	1·35	11·5	466·0	328·0	138·0	Suspicious.
54	Fredericton Junction, N.B.	A.A.C.	5–8–15	0·03	0·02	0·93	10·5	1294·0	1232·0	62·0	Free from contamination.
55	Cundles, Ont.	C.W.N.	5–8–15	0·23	0·13	3·90	8·1	454·0	314·0	140·0	Polluted.
56	Perth, Ont.	C.J.S.	6–8–15	0·16	0·10	1·35	34·6	548·0	428·0	128·0	Seriously polluted.
57	Wiste, Alberta	A.A.C.	6–8–15	0·42	0·04	2·66	29·6	2266·0	1992·0	274·0	Contaminated.
58	Cottam, Ont.	E.T.H.	7–8–15	2·18	0·16	Free.	965·0	2288·0	1956·0	332·0	Strongly saline.
59	Cottam, Ont.	E.T.H.	7–8–15	0·22	0·07	0·81	2·2	306·0	244·0	62·0	Suspicious.
60	Redlyn, Sask.	H.M.T.	9–8–15	3·02	0·50	0·033	74·5	4900·0	3936·0	964·0	Strongly saline.
61	Thornhill, Ont.	J.E.Mac.	9–8–15	0·18	0·08	18·3	88·0	956·0	582·0	374·0	Dangerous.
62	Kelvington, Sask.	R.H.M.	13–8–15	0·03	0·36	0·13	160·2	6032·0	4476·0	1556·0	Strongly saline.
63	Drummondville, P.Q.	C.S.F.	16–8–15	0·12	0·04	15·7	1·1	212·0	178·0	34·0	Slightly contaminated.
64	Perth, Ont.	C.T.S.	16–8–15	1·15	0·14	1·59	27·6	466·0	344·0	122·0	Seriously polluted.
65	Guthrie, Ont.	J.R.	17–8–15	0·05	0·05	20·33	110·2	962·0	704·0	258·0	Contaminated.
66	Winchester, Ont.	A.S.	18–8–15	0·03	0·02	0·21	64·0	911·0	496·0	415·0	Suspicious.
67	Chatham, N.B.	D.M.	18–8–15	Free.	0·09	0·33	12·4	96·0	20·0	76·0	Suspicious.
68	Chatham, N.B.	M.A.G.	18–8–15	0·02	0·05	0·10	1·9	100·0	44·9	56·0	
69	Almonte, Ont.	P.C.D.	19–8–15	0·23	0·37	22·29	53·5	974·0	66·0	338·0	Seriously contaminated.
70	Fernie, B.C.	W.R.W.	19–8–15	8·48	0·55	1·48	22·3	.....	.....	.....	Saline.
71	Coteau	A.M.D.	21–8–15	.....	.....	.....	93·8	1534·0	1122·0	412·0	Saline.
72	Brinston, Ont.	E.W.G.	23–8–15	0·66	0·08	0·49	2568·0	5030·0	.....	.....	Strongly saline.
73	Sintaluta, Sask.	H.C.B.	23–8–15	0·10	0·08	0·016	47·8	2592·0	1874·0	718·0	Strongly saline.
74	Wroxeter, Ont.	J.M.	25–8–15	0·16	0·08	0·91	1·4	220·0	132·0	88·0	Suspicious.
75	Lemesurier, P.Q.	T.G.	26–8–15	0·26	0·18	20·4	145·5	828·0	390·0	438·0	Seriously polluted.
76	Otterson, Ont.	A.W.C.	26–8–15	0·19	0·19	3·58	9·0	156·0	60·0	96·0	Seriously polluted.
77	Pointe au Pic, P.Q.	C.F.	30–8–15	0·11	0·13	0·12	Trace.	100·0	48·0	52·0	Seriously contaminated.
78	Avoca, P.Q.	A.M.P.	1–9–15	0·09	0·04	0·37	1·1	132·0	98·0	34·0	Free from pollution.
79	St. Andrews, N.B.	D.B.H.	7–9–15	0·06	0·09	0·25	5·7	172·0	130·0	42·0	Wholesome.
80	Falkland, B.C.	J.M.B.	9–9–15	.....	.....	.....	1·1	642·0	442·0	200·0	Wholesome.
81	Abitibi, Ont.	G.W.Y.	10–9–15	0·04	0·07	0·115	1·4	40·0	22·0	18·0	Pure and wholesome.
82	Toronto, Ont.	R. J. F.	11–9–15	0·97	0·17	0·04	8·0	236·0	182·0	54·0	Contaminated.
83	Laura, Sask.	J.E.Mc.	14–9–15	1·72	0·05	0·05	5·0	614·0	442·0	172·0	Wholesome.
84	Mirror, Alberta	P.B.	16–9–15	.....	.....	.....	56·0	930·0	640·0	290·0	Saline.
85	Swan River, Man.	J.L.	17–9–15	.....	.....	.....	48·0	1021·0	931·0	90·0	Saline.
86	Wychwood, P.Q.	W.M.B.	17–9–15	0·02	0·10	0·12	10·0	200·0	112·0	88·0	Wholesome.
87	Oakville, Ont.	A.F.	20–9–15	0·53	0·13	0·156	240·0	920·0	640·0	280·0	Polluted.
88	Enchant, Alberta	W.B.	20–9–15	0·70	0·15	0·628	40·0	2820·0	2310·0	510·0	Strongly saline.

ANALYSIS of Well Waters, 1915-1916—Results stated in Parts per Million—*Concluded.*

No.	Locality.	Marks.	Date.	Free Ammonia.	Albuminoid Ammonia.	Nitrogen in Nitrates and Nitrites	Chlorine.	Total Solids at 105° C.	Solids after Ignition	Loss on Ignition	Report.
89	Bury, P.Q.	R.E.O.	21-9-15	0·72	0·05	0·02	1·2	188·0	132·0	56·0	Suspicious.
90	Mayfield, Man.	J.A.H.	21-9-15	0·16	0·18	0·76	9·0	802·0	534·0	268·0	Suspicious.
91	Wallaceburg, Ont.	J.H.F.	22-10-15	.....	.....	.....	20·0	274·0	154·0	120·0	
92	Wallaceburg, Ont.	J.H.F.	22-10-15	.....	.....	.....	25·0	206·0	140·0	66·0	
93	Creston, B.C.	A.L.M.	22-9-15	0·16	0·32	0·63	5·6	468·0	296·0	172·0	Suspicious.
94	Honeydale, N.B.	G.B.	23-9-15	0·44	0·18	1·12	8·0	50·0	40·0	10·0	Contaminated.
95	Carmen, Man.	D.M.C.	24-9-15	8·20	0·01	0·12	3600·0	9850·0	9680·0	170·0	Saline.
96	Belleville, Ont.	A.S.W.	24-9-15	0·01	0·08	0·95	64·0	559·0	431·0	128·0	Free from pollution.
97	Belleville, Ont.	A.S.W.	24-9-15	0·04	0·28	0·02	48·0	780·0	590·0	190·0	Free from pollution.
98	Hagersville,	J.R.	24-9-15	0·59	0·04	0·01	290·0	3322·0	2322·0	1000·0	Strongly saline.
99	Barrington Passage, N.S.	N.S.	27-9-15	0·04	0·04	0·07	22·0	109·0	71·0	38·0	Safe and wholesome.
100	Barrington Passage, N.S.	N.S.	27-9-15	0·08	0·04	0·04	24·0	.....	.....	.....	Safe and wholesome.
101	Orillia, Ont.	G.W.	30-9-15	Free.	0·01	3·3	20·0	300·0	120·0	180·0	Contaminated.
102	Radcliffe, Alberta	G.G.	30-9-15	0·17	0·31	0·09	24·0	1886·0	1427·0	459·0	Saline.
103	Napierville, P.Q.	W.F.M.	4-10-15	0·08	0·14	0·62	136·0	1026·0	620·0	406·0	Polluted.
104	Arnprior, Ont.	R.B.	5-10-15	0·06	Free.	0·29	10·0	416·0	257·0	159·0	Suspicious.
105	Ottawa, Ont.	C.E.B.	6-10-15	0·02	Free.	4·45	15·0	566·0	376·0	190·0	Suspicious.
106	Alameda, Sask.	J.P.M.	8-10-15	3·53	0·04	Free.	30·0	2568·0	1928·0	640·0	Saline.
107	Morrin, Alberta	W.O.	12-10-15	0·01	0·01	0·32	5·0	1004·0	644·0	360·0	Saline.
108	Fredericton, N.B.	O.S.	12-10-15	Free.	0·01	1·66	49·0	570·0	220·0	350·0	Contaminated.
109	Williamsburg, Ont.	M.W.	15-10-15	0·44	0·02	Free.	16·0	376·0	307·0	69·0	Contaminated.
110	Clarenceville, P.Q.	W.T.M.	15-10-15	0·94	0·04	0·41	1700·0	3834·0	3090·0	744·0	Saline.
111	Clarenceville, P.Q.	W.T.M.	15-10-15	1·44	0·04	0·46	54·0	857·0	657·0	200·0	Seriously polluted.
112	St. John, N.B.	W.L.	21-10-15	Trace.	0·04	0·124	12·0	91·0	70·0	21·0	Free from pollution.
113	Fredericton, N.B.	F.Ltd.	25-10-15	0·01	0·15	0·255	5·0	105·0	50·0	55·0	Safe and wholesome.
114	Fredericton, N.B.	F. Ltd.	25-10-15	0·02	0·095	0·333	4·2	124·0	92·0	32·0	Safe and wholesome.
115	Fredericton, N.B.	F.Ltd.	25-10-15	0·01	0·085	0·106	6·2	148·0	92·0	56·0	Safe and wholesome.
116	Rockhurst, P.Q.	M.	3-11-15	0·07	0·15	0·14	7·0	210·0	132·0	78·0	Suspicious.
117	Brampton, Ont.	H.J.B.	26-10-15	2·05	0·11	0·108	6·5	488·0	372·0	117·0	Polluted.
118	Ste. Hyacinthe, P.Q.	M.St.J.	5-11-15	2·97	0·39	0·832	1700·0	3987·0	3515·0	472·0	Wholesome.
119	Vermillion, Alberta	J.S.M.	8-11-15	.....	.....	.....	30·0	4604·0	3644·0	960·0	Highly saline.
120	Cut Knife, Sask.	S.M.P.	10-11-15	.....	.....	.....	360·0	35880·0	28066·0	7814·0	Highly saline.
121	Westboro, Ont.	H.H.	15-11-15	0·125	0·08	0·045	10·0	204·0	128·0	76·0	Seriously polluted.
122	Ottawa, Ont.	F.H.	17-11-15	Free.	0·10	0·066	12·0	346·0	229·0	117·0	Probably wholesome.
123	Barrington Passage, N.S.	R.S.	18-11-15	0·14	0·16	1·085	27·0	148·0	110·0	38·0	Contaminated.
124	Barrington Passage, N.S.	R.S.	18-11-15	0·03	0·14	1·078	28·0	153·0	111·0	42·0	Contamintaed.
125	Aultsville, Ont	M.S.M.	18-11-15	0·33	0·16	0·154	280·0	947·0	832·0	115·0	Saline.
126	Magog, P.Q.	J.B.C.	18-11-15	0·07	0·19	2·89	10·0	288·0	218·0	70·0	Polluted.

127	Salisbury, N.B.	R.A.B.	22-11-15	0·01	0·05	0·075	2·0	316·0	247·0	69·0	Pure and wholesome.
128	Salisbury, N.B.	S.H.T.	22-11-15	0·15	0·25	0·085	4·0	217·0	156·0	61·0	Probably contaminated.
129	Salisbury, N.B.	S.H.T.	22-11-15	0·125	0·625	0·088	7·0	188·0	92·0	96·0	Probably contaminated.
130	Rockliffe, Ont.	C.R.C.	23-11-15	0·057	0·157	0·029	10·0	370·0	240·0	130·0	Free from pollution.
131	Silver Grove, Sask.	F.S.M.	24-11-15	0·03	0·41	1·885	58·0	1080·0	626·0	454·0	Polluted.
132	Ganges, B.C.	L.W.	24-11-15	0·07	0·05	0·12	320·0	1190·0	1146·0	44·0	Strongly saline.
133	Ganges, B.C.	L.W.	24-11-15	0·04	0·05	0·016	95·0	430·0	350·0	80·0	Wholesome.
134	Cyrville, Ont.	G.L.	29-11-15	0·07	0·17	0·22	58·0	658·0	482·0	176·0	Suspicious.
135	Kinburn, Ont.	G.J.	30-11-15	Free.	0·05	6·02	290·0	1410·0	1020·0	390·0	Strongly saline.
136	Kinburn, Ont.	L.G.	30-11-15	0·02	0·10	0·264	6·0	308·0	264·0	44·0	Wholesome.
137	Caledonia Springs, Ont.	C.P.R.	30-11-15	0·11	0·53	0·19	36·0	348·0	220·0	128·0	Polluted.
138	Irricana, Alberta	V.R.C.	1-12-15	0·02	0·39	8·615	38·0	4510·0	3838·0	672·0	Highly saline.
139	Arnprior, Ont.	G.E.G.	3-12-15	0·24	0·62	2·41	50·0	532·0	368·0	164·0	Seriously contaminated.
140	Stockholm, Sask.	G.M.	4-12-15	1·48	0·35	0·28	14·0	3206·0	264·0	566·0	Strongly saline.
141	Fredericton, N.B.	C.M.	8-12-15	0·06	0·26	0·085	6·0	80·0	31·0	49·0	Not a first class water.
142	Melita, Man.	A.B.C.	9-12-15				25·0	876·0	714·0	162·0	Not a first class water.
143	Waterton Lakes, Alberta	D.P.B.	10-12-15	1·42	0·62	0·08	Free.	240·0	101·0	139·0	Polluted.
144	Edgerton, Alberta	W.L.	12-12-15	0·30	0·40	0·115	22·0	1790·0	1348·0	442·0	Not a good water.
145	Redmill, P.Q.	J.B.	14-12-15	0·19	0·25	0·089	8·8	143·0	100·0	43·0	Not a first class water
146	West Lorne, Ont.	A.J.Mc.	17-12-15	0·13	0·23	0·387	2·0	206·0	160·0	46·0	Polluted.
147	Westboro, Ont.	W.H.H.	20-12-15	0·15	0·25	0·10	36·0	601·0	535·0	66·0	Contaminated.
148	Frys, Sask.	J.P.	20-12-15	0·04	0·38	5·59	7·8	372·0	255·0	117·0	Polluted.
149	Glen Ewen, Sask.	E.E.B.	27-12-15	4·63	1·32	0·354	154·0	1810·0	1332·0	478·0	Suspicious.
150	Smiths Falls, Ont.	G.A.M.	29-12-15	6·87	0·50	1·72	31·0	710·0	510·0	200·0	Unfit for use.
151	Berlin, Ont.	E.P.	30-12-15	0·02	0·23	8·81	140·0	1500·0	1025·0	475·0	Contaminated.
152	Lanark, Ont.	B.C.	3-1-16	0·02	0·19	0·09	Free.	172·0	130·0	42·0	Free from pollution.
153	Nicolet, P.Q.	A.St.C.	5-1-16	1·83	0·63	0·12	270·0	1500·0	1260·0	240·0	Seriously polluted.
154	Camden East, Ont.	W.F.B.	5-1-16	2·99	0·37	0·635	19000·0	40850·0	35541·0	5309·0	Strongly saline.
155	Sutton, N.B.	A.L.B.	7-1-16	0·07	0·18	1·84	22·0	220·0	155·0	65·0	Not a first class quality.
156	Meach Lake, P.Q.	E.J.S.	28-1-16				2·0	82·0	45·0	37·0	Free from pollution.
157	Westboro, Ont.	N.R.	29-1-16	0·77	0·23	2·79	18·0	447·0	330·0	117·0	Contaminated.
158	Denfield, Ont.	A.F.N.	2-2-16	0·24	0·55	1·745	10·0	510·0	420·0	90·0	Seriously polluted.
159	Ste. Madelaine, P.Q.	A.E.D.	11-2-16	3·67	0·20	1·18	5100·0	9358·0	992·0	8366·0	Strongly saline.
160	Bassin du Lievre, P.Q.	S.J.	19-2-16	0·09	0·78	0·83	60·0	1008·0	878·0	130·0	Not a good water.
161	Woodlawn, Ont.	D.B.Mc.	22-2-16	Free.	0·91	Free.	13·0	1650·0	1025·0	625·0	Free from pollution.
162	Eastview, Ont.	P.N.	23-2-16	0·29	0·26	0·14	60·0	498·0	370·0	128·0	Polluted.
163	Brownfield, Alberta	F.L.	25-2-16	4·99	0·15	1·52	12·0	4232·0	3914·0	318·0	Strongly saline.
164	Pritchard, B.C.	M.A.S.	1-3-16	0·68	0·27	2·28	25·0	587·0	343·0	244·0	Contaminated.
165	Halifax, N.S.	S.G.B.	3-3-16	0·22	0·18	0·54	23·7	91·0	73·0	18·0	Contaminated.
166	Nepawa, Man.	J.A.C.	7-3-16	2·27	0·24	2·20	180·0	2038·0	1959·0	79·0	Strongly saline.
167	Billings Bridge, Ont.	J.E.G.	10-3-16	0·18	0·50	6·50	95·0	643·0	473·0	170·0	Seriously contaminated.
168	Yamachichi, P.Q.	P.G.	11-3-16	13·47	0·43	Free.	1300·0	20424·0	17504·0	2920·0	Strongly saline.
169	Ottawa South, Ont.	R.S.	13-3-16	0·09	0·05	0·47	12·0	272·0	212·0	60·0	Not a first class water.
170	Ottawa South, Ont.	M.B.	13-3-16	0·07	0·05	0·32	22·0	370·0	226·0	144·0	Not a first class water.
171	Yamachichi, P.Q.	L.G.	22-3-16	15·75	0·34	6·255	11800·0	24016·0	19536·0	4480·0	Strongly saline.
172	Marquette, Man.	T.B.H.	25-3-16				100·0	596·0	398·0	198·0	Wholesome.
173	Smiths Cove, N.S.	G.R.W.	30-3-16	0·15	0·11	0·19	30·0	170·0	80·0	90·0	Contaminated.

DOMINION OF CANADA

DEPARTMENT OF AGRICULTURE

DOMINION EXPERIMENTAL FARMS

REPORT

FROM THE

DIVISION OF FIELD HUSBANDRY

FOR THE YEAR ENDING MARCH 31, 1916.

PREPARED BY

Acting Assistant Dominion Field Husbandman, Central Farm	W. L. Graham, B.S.A.
Superintendent—	
Experimental Station, Charlottetown, P.E.I.	J. A. Clark, B.S.A.
Experimental Farm, Nappan, N.S.	W. W. Baird, B.S.A.
Experimental Station, Kentville, N.S.	W. Saxby Blair.
Experimental Station, Fredericton, N.B.	W. W. Hubbard.
Experimental Station, Ste. Anne de la Pocatière, Qué.	Jos. Bégin.
Experimental Station, Cap Rouge, Que.	G. A. Langelier.
Experimental Farm, Brandon, Man.	W. C. McKillican, B.S.A.
Experimental Farm, Indian Head, Sask.	W. H. Gibson, B.S.A.
Experimental Station, Rosthern, Sask.	Wm. A. Munro, B.A., B.S.A.
Experimental Station, Scott, Sask.	M. J. Tinline, B.S.A. (Acting).
Experimental Station, Lethbridge, Alta.	W. H. Fairfield, M.S.
Experimental Station, Lacombe, Alta.	G. H. Hutton, B.S.A.
Experimental Station, Invermere, B.C.	G. E. Parham.
Experimental Farm, Agassiz, B.C.	P. H. Moore, B.S.A.
Experimental Station, Sidney, B.C.	L. Stevenson, B.S.A., M.S.

REPORT

FROM THE

DIVISION OF FIELD HUSBANDRY

CENTRAL EXPERIMENTAL FARM,

OTTAWA, March 31, 1916.

J. H. GRISDALE, B. Agr.,
Director, Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith reports of the work conducted by the Division of Field Husbandry at the Central Experimental Farm and the branch Experimental Farms and Stations during the year 1915.

As already explained in previous reports the work of this Division is of a practical nature, consisting of soil and crop management and agricultural engineering. The main features dealt with under the foregoing general heads may be summarized as follows:—

Weather conditions.
Crop yields.
Rotation of crops.
Cost of production of field crops.
Weed eradication.
Use of barnyard manure and commercial fertilizers.
Irrigation and underdrainage.
Clearing land, fencing, etc.

It will be noted that the field experiments under way at the Central Experimental Farm are comparatively few in number, and attention may be drawn again to the present lack of sufficient land suitable for such purposes. The soil, other than that devoted to experiments herein reported upon is so variable in type that satisfactory field tests are practically impossible. Thus, in order for the Division to render the best service possible for the district it represents, more land of suitable quality must be made available.

I have the honour to be, sir,
Your obedient servant,

W. L. GRAHAM,
Acting Assistant Dominion Field Husbandman.

CENTRAL EXPERIMENTAL FARM, OTTAWA.

REPORT OF THE ACTING ASSISTANT DOMINION FIELD HUSBANDMAN.

W. L. GRAHAM, B.S.A.

WEATHER CONDITIONS AND CROP NOTES, 1915.

The season of 1915 was characterized by an early seeding and a wet harvest. Spring seeding was in progress on April 21 and was continuous until finished on the 29th of April. The temperatures, lower than usual during the month of May, retarded the growth of grain which had made a promising start. Corn planting, too, was delayed, on account of the cool weather, until the end of the month. The forepart of June was dry, and during the month the first cut of hay was taken. In July, Indian corn, roots, and grain made good progress but the latter was harvested with difficulty in August when the heaviest rainfall in years for that month was recorded. On September 26 violent winds damaged the corn crop, making the harvest tedious, more especially where the corn had been allowed to grow too thickly. The weather continued fine throughout the month of October, providing a favourable opportunity for the harvesting of roots and potatoes and the finishing of autumn ploughing.

The following record of the weather and field operations may be of interest:—

First date of sowing field grain	April 21.
" " mangels	May 6.
Date of sowing potatoes	" 12.
First date of sowing corn	" 21.
Date of commencing hay harvest	June 23.
" " grain harvest	Aug. 3.
" " corn cutting	Sept. 13.
" harvesting roots	Oct. 21.
" freezing up	Dec. 2.

Some Weather Observations taken at Central Experimental Farm, Ottawa, 1915.

Month.	Temperature F.			Precipitation.				Total. Sunshine.
	Mean.	Highest.	Lowest.	Rainfall.	Snowfall.	Total.	Heaviest in 24 hrs.	
	°	°	°	Inches.	Inches.	Inches.	Inches.	Hours.
January	14·78	40·0	−25·4	0·97	21·50	3·12	0·70	87·1
February	19·36	40·0	−10·5	0·69	15·25	2·21	0·40	100·3
March	25·99	45·6	3·0	0·47	2·00	0·67	0·23	211·3
April	49·68	87·2	25·0	0·99	.....	0·99	0·44	209·4
May	51·83	78·6	31·8	1·86	.....	1·86	0·31	229·5
June	64·95	90·1	46·2	2·94	.....	2·94	1·23	301·2
July	68·74	92·0	50·0	2·12	.....	2·12	1·08	282·6
August	64·49	86·0	38·0	7·09	.....	7·09	1·82	182·4
September	61·07	88·7	35·0	2·87	.....	2·87	0·69	217·2
October	49·16	72·4	26·6	1·30	.....	1·30	0·53	153·1
November	35·12	60·8	14·0	1·11	0·50	1·16	0·44	88·2
December	20·66	37·0	− 8·2	0·36	38·50	4·21	0·84	64·2
Total for year				22·77	77·75	30·54		
Average for thirteen years				.....	.....	32·42		
Total for six growing months, April to September				.....	.....	17·87		
Average for thirteen years for six growing months, April to September				.....	.....	16·96		

Note.—Ten inches of snow equals one inch of rain.

FIELD CROP YIELDS.

The following yields were obtained on the area devoted to the regular farm rotation. This rotation is of three years duration and includes hoed, grain and hay crops. The yields are slightly better than the average of past years.

Yield of Field Crops, Central Experimental Farm, 1915.

Crop.	Area.	Total yields.		Average yields per acre	
	Acres.	Tons. Lb.	Bush Lb.	Tons. Lb.	Bush. Lb.
Corn	32·3	535 1,190	.....	16 1,163	.....
Roots	3	58 10	1,933 30	19 670	644 30
Oats	38·5	.....	2,670 5	.....	69 12
Oat straw	38·5	45 1,990	.....	1 389	.....
Hay	30·0	110 360	.....	3 1,345	.....

COST OF PRODUCTION OF FIELD CROPS.

The following figures on the cost of production of field crops have been computed from yields obtained under average field conditions. The values used are those fixed for calculating the rotation results, and are given in detail on page 198 of this report. The crops reported upon include roots, corn, oats, and hay.

COST OF PRODUCTION OF MANGELS.

One acre of mangels was grown in a four-year rotation of mangels, grain, clover hay, timothy hay. The timothy sod was manured at the rate of 15 tons per acre, ploughed shallow early in August, top-worked and ribbed up in late autumn, in part preparation for the mangels.

Number of acres, 1.

Rent of land at $3 per acre	$3 00
Use of machinery at 60 cents per acre	60
Fourth share of manure at rate of 15 tons per acre at $1 per ton	3 75
Ploughing in autumn, 4 hours 3-horse team at 41 cents	1 64
Discing and packing, 4½ hours 4-horse team at 48 cents	2 16
Ribbing, in autumn, 2 hours 2-horse team at 34 cents	68
Harrowing and rolling, 1 hour 2-horse team at 34 cents	34
Drilling and seeding, 2 hours single horse at 27 cents	54
Seed, 10 pounds at 20 cents	2 00
Hoeing, 30 hours manual labour at 17 cents	5 10
Cultivating, 10 hours single horse at 27 cents	2 70
Pulling, loading and unloading, 55 hours manual labour at 17 cents.	9 35
Hauling, 6 hours 2-horse team at 34 cents	2 04
Total cost for 1 acre	$33 90
Yield per acre, bush.	729·1
" " tons.	21·87
Cost per bushel, cents.	4·65
Cost per ton, $	1·55

COST OF PRODUCTION OF ENSILAGE CORN.

Thirty-two and three-tenth acres of ensilage corn were grown in a three-year rotation of corn, grain, clover hay. The land was manured at the rate of 18 tons per acre and spring-ploughed, turning under the manure and growth of clover.

Number of acres, 32·3.

Rent of land at $3 per acre	$ 96 90
Use of machinery at 60 cents per acre	19 38
Third share of manure at rate of 18 tons per acre, at $1 per ton	193 80
Ploughing, 125 hours, 3-horse team at 41 cents	51 25
Discing, 44 hours, 4-horse team at 48 cents	21 12
Packing, 12 hours, 4-horse team at 48 cents	5 76
Harrowing, 26 hours, 2-horse team at 34 cents	8 84
Rolling, 16½ hours, 2-horse team at 34 cents	5 61
Seeding, 16 hours, 2-horse team at 34 cents	5 44
Cultivating, 92 hours, 2-horse team at 34 cents	31 28
" 46 " single horse at 27 cents	12 42
Hoeing, 428 hours manual labour at 17 cents	72 76
Cutting, 48 hours, 3-horse team at 41 cents	19 68
Loading, unloading, tramping, etc., 1,213 hours manual labour at 17 cents	206 21
Twine, 175 pounds at 14 cents	24 50
Total cost for 32·3 acres	$774 95
Cost per acre	23 99
Yield per acre, tons.	16 58
Cost per ton, $	1 45

OTTAWA.

COST OF PRODUCTION OF OATS.

Thirty-eight and one-half acres of oats were grown in a three-year rotation of corn, oats, clover hay. The corn ground was ploughed in the autumn, and with the oats was seeded a mixture of timothy, early red and alsike clover and alfalfa.

Number of acres, 38·5.	
Rent of land at $3 per acre	$115 50
Use of machinery at 60 cents per acre	23 10
Third share of manure at rate of 18 tons per acre at $1 per ton	231 00
Ploughing in autumn, 160 hours, 3-horse team at 41 cents	65 60
Discing, 61½ hours, 4-horse team at 48 cents	29 52
Harrowing, 33½ hours, 2-horse team at 34 cents	11 39
Rolling, 20 hours, 2-horse team at 34 cents	6 80
Seeding, 20 hours, 3-horse team at 41 cents	8 20
Cutting, 30 hours, 3-horse team at 41 cents	12 30
Stooking, 68 hours manual labour at 17 cents	19 56
Hauling, 92 hours, 2-horse team at 34 cents	31 28
Loading and unloading, 141 hours manual labour at 17 cents	23 97
Threshing, 2,670 bushels at 1⅔ cents per bushel	44 50
Total cost for 38·5 acres	$622 72
Cost per acre	16 17
Yield of grain per acre	69·4 bush.
" straw per acre	1·19 tons.
Cost per bushel of grain (grain valued at 34 cents per bushel and straw at $4 per ton)	19·39 cents.
Cost per ton of straw	$ 2.28

NOTE.—The relative costs of grain and straw are estimated in the following manner.

Total revenue per acre from grain and straw is (69·4 bushels at 34 cents) + (1·19 tons at $4) = $28.35.

When revenue is $28.35, cost to produce is $16.17.

When revenue (from 69·4 bushels grain) is $23.59, cost to produce per bushel is—

$$\frac{23{\cdot}59 \times 16{\cdot}17}{28{\cdot}35 \times 69{\cdot}4} = 19{\cdot}39 \text{ cents.}$$

When revenue (from 1·19 tons straw) is $4.76, cost to produce per bushel is—

$$\frac{4{\cdot}76 \times 16{\cdot}17}{28{\cdot}35 \times 1{\cdot}19} = \$2.28.$$

COST OF PRODUCTION OF HAY.

Thirty acres of hay were grown in a three-year rotation of corn, grain, clover hay and three cuts were taken.

Number of acres, 30.	
Rent of land at $3 per acre	$ 90 00
Use of machinery at 60 cents per acre	18 00
Third share of manure, at rate of 18 tons per acre, at $1 per ton	180 00
Seed, 10 pounds red clover at 22 cents; 2 lb. alsike at 21½ cents; 6 pounds alfalfa at 26 cents; 6 pounds timothy at 11 cents	145 50
Cutting, 63 hours, 2-horse team at 34 cents	21 42
Tedding, 15 hours, single horse at 27 cents	4 05
Raking, 20 hours, 2-horse team at 34 cents	6 80
Raking, 16 hours, single horse at 27 cents	4 32
Coiling, 92 hours manual labour at 17 cents	15 64
Hauling, 90 hours, 2-horse team at 34 cents	30 60
Loading, 200 hours, manual labour at 17 cents	34 00
Total cost for 30 acres	$550 33
Cost per acre	18 34
Yield per acre	3·67 tons.
Cost per ton	$ 5 00

The following table gives a summary of the preceding detailed records of the cost of production of mangels, corn, oats, and hay. The results for the year 1915 when compared with those for the previous year show that mangels and hay were produced at a much reduced cost in 1915, while for ensilage corn, oats and oat straw the costs were identical for the two years.

Cost of Production of Field Crops, Central Farm, 1915.

Crop.	Area.	Yield per acre.		Cost to produce.		
				Per acre.	Per ton.	Per bush.
	Acres.	Tons.	Bush.	$ cts.	$ cts.	Cents.
Mangels	1·00	21·87	729·1	33 90	1 55	4·65
Ensilage corn	32·30	16·58	-	23 99	1 45	..
Oats	38·50	....	69·4	16 17	....	19·39
Oat straw	38·50	1·19	.....	.....	2 28	.....
Hay	30·00	3·67	.....	18 34	5 00	.....

ROTATION OF CROPS.

The practice of a rotation of crops involves the growing of a succession of different crops on the same area. Furthermore, it is a system of cropping that insures a crop every year, and for this reason is gradually replacing the single crop or haphazard plan where a profitable crop is produced only in what is termed "a good year." For local conditions a rotation of crops may be stated to include the growing of hoed, grain, and hay crops on a given area of land and in such succession as to ensure a profitable crop, the maintenance of the fertility of the soil, the control of weeds, crop pests and diseases, and a suitable moisture supply.

The possibility of obtaining the above results is due to the fact that each crop leaves the soil in the best condition for the succeeding crop. Hoed crops grown under careful cultural management aid materially in preparing the land for a crop of grain and for seeding mixtures of clovers and grasses. A seed-bed is provided, free from weeds and with a suitable available supply of plant food and moisture to produce a large yield of grain and a comparatively light yield of straw. Alfalfa and clovers enrich the soil by adding supplies of nitrogen from the air which is stored in the root systems deep in the soil. These root systems, too, improve the mechanical condition of the soil, thus furnishing a condition of tilth essential for the production of maximum root and corn crops.

The foregoing are a few of the benefits that are to be derived from a judicious cropping system or rotation of crops. These agents are under the control of every farmer, and no system of crop management can be efficient unless a crop rotation is adopted.

The following rotations have been planned to meet the requirements of the live-stock farmer in eastern Ontario and Quebec. One or other of them is likely to be found suitable and should prove satisfactory where all operations, including soil treatment, are thoroughly performed.

OTTAWA.

ROTATION "A" (FIVE YEARS' DURATION).

First year.—Hoed crops. When corn is the hoed crop used, manure is applied in spring at the rate of 15 tons per acre and shallow ploughed shortly before planting time, turning under clover and manure. After the hoed crop is harvested, land is shallow ploughed or cultivated.

Second year.—Grain. Seeded down with 8 pounds of red clover, 2 pounds alsike and 10 pounds timothy per acre.

Third year.—Clover hay. Two crops expected. Top-dressed in fall with manure at rate of 15 tons per acre.

Fourth year.—Timothy hay. Field ploughed in August, top-worked and ribbed up in October.

Fifth year.—Grain. Seeded down with 10 pounds red clover, which is allowed to grow to be turned under following spring, when the hoed crop is corn.

This rotation has proved an excellent one on the Central Experimental Farm, Ottawa. When carefully followed, and when cultural operations are well performed, weeds have been kept under fair control and crop yields have been maintained. One-fifth of the land is in hoed crop, two-fifths in grain, one-fifth in clover hay and one-fifth in timothy hay or pasture. It supplies a relatively larger proportion of grain to roots and hay than the ordinary three- or four-course rotation, and for that reason would be preferable where considerable grain is called for.

ROTATION "B" (FIVE YEARS' DURATION).

First year.—Hoed crop. When corn is the hoed crop used, manure is applied in spring at rate of 15 tons per acre, and shallow ploughed shortly before planting time, turning under both clover and manure.

Second year.—Grain. Seeded down with 10 pounds of red clover, 2 pounds alsike, and 5 pounds timothy per acre, manured at rate of 15 tons per acre.

Third year.—Hay. Ploughed late fall.

Fourth year.—Grain. Seeded down with 10 pounds red clover, 2 pounds alsike and 5 pounds timothy per acre.

Fifth year.—Clover hay.

Though the arrangement is different, this rotation is very similar to "A" in the relative amounts of the different crops it supplies. In "A" both clover and timothy hay are provided, whereas in "B" clover hay only is grown. "B" has maintained crop yields, and has given profits equal to "A" in the tests so far conducted, but as indicated, does not answer the purpose where a certain proportion of timothy hay is called for. It can, however, be very easily extended into a six- or seven-year rotation to include timothy hay or pasture.

ROTATION "C" (FOUR YEARS' DURATION).

First year.—Hoed crop.

Second year.—Grain. Seeded down with 10 pounds red clover and 12 pounds timothy per acre.

Third year.—Clover hay.

Fourth year.—Timothy hay. Field ploughed in August. Manured at rate of 24 tons per acre, worked at intervals and ridged up in late fall in preparation for hoed crops.

This rotation is most satisfactory from all standpoints, except that it supplies a rather smaller proportion of grain than is often desired. Where live stock is the mainstay of the farm this is, however, a very minor fault.

OTTAWA.

The rotation might be extended to include one or two years of pasture following the timothy hay, and while this arrangement is not considered as desirable as the shorter rotations, it might do fairly well where manual labour is scarce.

ROTATION "D" (THREE YEARS' DURATION).

First year.—Hoed crop. For corn, manure is applied in spring at rate of 18 tons per acre, and shallow ploughed shortly before planting time, turning under both clover and manure. For roots, land should be ploughed previous fall.

Second year.—Grain seeded down with 10 pounds red clover, 2 pounds alsike, 6 pounds alfalfa and 6 pounds timothy per acre.

Third year.—Clover hay.

This rotation is well suited for intensive dairy farming where soiling crops are used. It would be a most excellent rotation to put into practice where sufficient rough land was available to serve as pasturage. It is the rotation that would supply the greatest amount of forage of the best description for dairying or beef production. It is better suited for heavy than for light soils.

ROTATION "R" (THREE YEARS' DURATION).

First year.—Corn. Manure applied in spring at rate of 18 tons per acre. Shallow ploughed shortly before corn planting time, turning under both clover and manure.

Second year.—Peas and oats mixed. Cut green for cattle. Seeded down with 10 pounds red clover, 2 pounds alsike, 6 pounds alfalfa, and 6 pounds timothy per acre.

Third year.—Clover hay. Cut green for cattle.

This rotation is designed to supply soiling crops and has been under test for the past four years.

SUMMARY.

The following is a summary of the characteristics common to all the rotations outlined in the foregoing:—

1. Grain fields are always seeded down with clover, even though it be used only as a fertilizer, as in the case of the fifth year of rotation "A."

2. Grass and clover seedings are heavy. Increased crops of hay and rare failures of a catch have justified this practice.

3. Hoed crops form a large proportion of every rotation. An attempt to farm a small area without a hoed crop was not successful. Weeds could not readily be kept in check.

4. No field is left in hay for more than two successive years. Our records show that the second crop almost always costs more per ton than the first, and that succeeding crops are very liable to be grown at a loss.

5. Barnyard manure is applied frequently in comparatively small quantities, rather than at long intervals in large quantities.

In order that the net profits (profits after deducting cost of rent, all manual and horse labour, manure, seed, twine and use of machinery) as well as the yields of these rotations might be determined, careful records have been kept of all items chargeable against the rotations.

OTTAWA.

The following values have been fixed and are being used in this and similar work on all the eastern branch Farms and Stations.

COST VALUES.

Manual labour	$0 17 per hour.
Horse labour, including teamster—	
Single horse	27 "
2-horse team	34 "
3-horse team	41 "
4-horse team	48 "
Additional horses, each	7 "
Rent	3 00 per acre.
Machinery (inclusive of threshing machinery)	60 "
Barnyard manure (spread)	1 00 per ton.
Commercial fertilizers charged at cost.	
Seed wheat, oats, barley, buckwheat and rye	1 00 per acre.
Seed peas	2 00 "
Turnip, mangel, potato and corn seed charged at cost.	
Grass and clover seed charged at cost, total cost distributed over the number of years in hay and pasture.	
Twine charged at cost.	
Threshing charged according to actual labour expended, the items charged under this head to include only such operations as begin after the load of grain arrives at the feed table, or after the grain is stacked or placed in the mow ready to be thrown on the feed table. Loading, hauling, etc., to be charged to manual and horse labour.	

RETURN VALUES.

Wheat, oats, barley, rye and buckwheat	$0 01 per pound.
Peas	1¼ "
Hay (timothy, clover, alfalfa or mixed)	7 00 per ton.
Straw (wheat, oat, barley, rye, buckwheat or peas)	4 00 "
Corn ensilage	2 00 "
Sugar beets	3 00 "
Forage crops (green)	2 00 "
Turnips, carrots and mangels	2 00 "
Potatoes	50 per bush.
Pasture—	
Horses, per head	1 00 per month.
Cattle, per head	1 00 "
Sheep, per head	25 "

The items for which there are no fixed charges have been valued as follows:—

Red clover	$22 00 per 100 lb
Timothy	11 00 "
Alsike clover	21 50 "
Alfalfa	26 00 "
Seed corn	2 00 per bushel.
Mangel seed	20 per pound.
Turnip seed	20 "
Twine	14 "
Threshing	6 per 100 lb

The returns of 1915 were slightly better than for the past few years, due largely to the season which was especially favourable to growth.

The harvesting of grain was, however, tedious on account of the wet weather, and the yields were considerably lowered by loss through shelling; nevertheless, the rotations all show a profit. A summary of the results obtained from these rotations in 1915 is herewith submitted while following the summary will be found a detailed table of all items in connection with these rotations.

OTTAWA.

Costs, Returns and Net Profits of Rotations. "A," "B," "C," "D," and "R."

Rotation.	Cost to operate per acre.	Value of returns per acre.	Profits per acre 1915.
	$ cts.	$ cts.	$ cts.
A (five years' duration)	18 22	23 01	4 79
B (five " ")	17 78	18 75	97
C (four " ")	18 10	22 44	4 34
D (three " ")	20 44	23 47	3 03
R (three " ")	21 57	28 79	7 22

The following table contains details in

ROTATION

Rotation year.	Crops.		Area.	Items of Expense: Rent and manure.	Seed, twine and use of machinery.	Manual labour.		Horse labour (including teamster). Hours.				
						Hours.	Cost.	Single horse	2-horse team	3-horse team	4-horse team	5-horse team
	1914.	1915.	Ac.	$ c.	$ c.	No.	$ c.	No.	No.	No.	No.	No.
1st	Oats	Corn	1	9 44	1 98	35·0	5 95	1·0	25·0	1·5	1·5	.....
2nd	Hay	Oats	1	9 44	1 95	3·5	59	.....	3·0	5·25	1·5	.....
3rd	Hay	Hay	1	9 44	2 24	7·25	1 23	2·5	4·0	.....	.....	.....
4th	Oats	Hay	1	9 44	2 24	4·25	72	1·5	2·0	.....	.....	.....
5th	Corn	Oats	1	9 44	1 95	3·50	59	.....	2·5	5·25	5·0	.....
	Aggregate		5	47 20	10 36	53·50	9 08	5·0	36·5	12·0	8·0	.....
	Average per acre, 1915		.....	9 44	2 07	10·70	1 82	1·0	7·3	2·4	1·6	.....
	ROTATION											
1st	Hay	Corn	1	9 00	1 98	35·0	5 95	1·0	25·00	1·5	1·5	.....
2nd	Corn	Oats	1	9 00	1 95	3·5	59	.....	3·00	5·25	1·5	.....
3rd	Oats	Hay	1	9 00	3 78	4·25	72	1·0	2·50	.....	.....	.....
4th	Hay	Oats	1	9 00	1 95	3·50	59	.....	3·00	5·25	1·5	.....
5th	Oats	Hay	1	9 00	3 78	4·25	72	1·0	2·50	.....	.....	.....
	Aggregate		5	45 00	13 44	50·50	8 57	3·0	36·00	12·00	4·5	.....
	Average per acre, 1915		.....	9 00	2 69	10·10	1 71	0·6	7·20	2·40	·9	.....
	ROTATION											
1st	Hay	Corn	1	9 00	1 88	35·0	5 95	1·0	17·5	5·5	5·0	.....
2nd	Corn	Oats	1	9 00	1 95	3·5	59	.....	3·0	5·25	1·5	.....
3rd	Oats	Hay	1	9 00	2 36	7·25	1 23	2·5	4·0	.....	.....	.....
4th	Hay	Hay	1	9 00	2 36	7·25	72	1·5	2·0	.....	.....	.....
	Aggregate		4	36 00	8 55	50·0	8 49	5·0	26·5	10·75	6·5	.....
	Average per acre, 1915		.....	9 00	2 14	12·5	2 12	1·25	6·62	2·69	1·63	.....
	ROTATION											
1st	Hay	Corn	1	9 00	1 95	35·00	5 95	1·0	25·0	1·5	1·5	.....
2nd	Corn	Oats	1	9 00	1 95	3·50	59	.....	3·0	5·25	1·5	.....
3rd	Oats	Hay	1	9 00	5 45	7·25	1 23	2·5	4·0	.....	.....	.....
	Aggregate		3	27 00	9 35	45·75	7 77	3·5	32·0	6·75	3·0	.....
	Average per acre, 1915		.....	9 00	3 11	15·25	2 59	1·17	10·67	2·25	1·0	.....
	ROTATION											
1st	Hay	Corn	1·6	14 40	3 12	48·0	8 16	2·5	24·75	8·5	2·5	.....
2nd	Corn	Peas and Oats	1·6	14 40	5 76	24·0	4 08	1·5	15·75	6·5	3·0	.....
3rd	Peas and Oats	Hay	1·6	14 40	8 72	15·5	2 63	6·0	8·25	.....	.....	.....
	Aggregate		4·8	43 20	17 60	87·5	14 87	10·0	48·75	15·0	5·5	.....
	Average per acre, 1915		.....	9 00	3 66	18·2	3 10	2·08	10·16	3·12	1·15	.....

connection with the rotations in 1915:—

"A" (five years' duration).

in raising crop.						Particulars of crop.						
						Weight.						
Value of horse labour.	Cost of threshing.	Total cost.	Cost for 1 acre.	Cost for 1 bushel.	Cost for 1 ton.	Grain.	Straw.	Hay.	Roots, ensilage, or green feed.	Total value.	Value of crop per acre.	Profit or loss per acre.
$ c.	$ c.	$ c.	$ c.	cts.	$ c.	Lb.	Lb.	Lb.	Lb.	$ c.	$ c.	$ c.
10 10	....	27 47	27 47	.....	1 64	.....	.....	.....	33,445	33 45	33 45	5 98
3 89	1 08	16 95	16 95	32·0	....	1,800	2,210	.....	.....	22 42	22 42	5 47
2 03	....	14 94	14 94	....	4 85	.....	.....	6,155	.....	21 56	21 56	6 62
1 08	.....	13 48	13 48	.....	5 83	.....	.....	4,630	.....	16 20	16 20	2 69
5 41	88	18 27	18 27	42·3	.....	1,470	3,350	.....	.....	21 40	21 40	3 13
22 51	1 96	91 11	.....	.....	.....	.....	.....	.....	.....	115 03	.....	.....
4 50	39	.....	18 22	.....	.....	.....	.....	.....	.....	.....	23 01	4 79
"B" (five years' duration).												
10 10	.....	27 03	27 03	.....	2 07	.....	.....	.....	26,075	26 07	26 07	— 96
3 89	94	16 37	16 37	35·4	....	1,571	2,629	.....	.....	20 97	20 97	4 60
1 12	.....	14 62	14 62	.....	6 62	.....	.....	4,425	.....	15 47	15 47	85
3 89	84	16 27	16 27	39·6	.....	1,398	2,202	.....	.....	18 38	18 38	2 11
1 12	.....	14 62	14 62	.....	7 95	.....	.....	3,675	.....	12 88	12 88	—1 74
20 12	1 78	88 91	.....	.....	.....	.....	.....	.....	.....	93 77	.....	.....
4 02	36	.....	17 78	.....	.....	.....	.....	.....	.....	.....	18 75	97
"C" (four years' duration).												
10 87	.....	27 70	27 70	.....	2 60	.....	.....	.....	21,350	21 34	21 34	—6 36
3 89	1 48	16 91	16 91	23·2	....	2,475	3,500	.....	.....	31 75	31 75	14 84
2 03	....	14 62	14 62	....	4 53	.....	.....	6,455	.....	22 61	22 61	7 99
1 08	.....	13 16	13 16	....	6 55	.....	.....	4,030	.....	14 07	14 07	91
17 87	1 48	72 39	.....	.....	.....	.....	.....	.....	.....	89 77	.....	.....
4 47	37	.....	18 10	.....	.....	.....	.....	.....	.....	.....	22 44	4 34
"D" (three years' duration).												
10 10	....	27 00	27 00	.....	2 03	.....	.....	.....	26,650	26 64	26 64	— 36
3 89	1 19	16 62	16 62	28·4	....	1,989	2,906	.....	.....	25 70	25 70	9 08
2 03	.....	17 71	17 71	.....	6 86	.....	.....	5,160	.....	18 06	18 06	35
16 02	1 19	61 33	.....	.....	.....	.....	.....	.....	.....	70 40	.....	.....
5 34	40	.....	20 44	.....	.....	.....	.....	.....	.....	.....	23 47	3 03
"R" (three years' duration).												
13 60	.....	39 28	24 55	.....	1 92	.....	.....	.....	40,855	40 85	25 53	98
9 86	.....	34 10	21 31	.....	2 00	.....	.....	.....	34,080	34 08	21 30	— 01
4 43	.....	30 18	18 86	.....	3 34	.....	.....	18,075	.....	63 28	39 55	20 69
27 89	.....	103 56	.....	.....	.....	.....	.....	.....	.....	138 21	.....	.....
5 81	.....	.....	21 57	.....	.....	.....	.....	.....	.....	.....	28 79	7 22

SHALLOW PLOUGHING AND SUBSOILING VERSUS DEEP PLOUGHING.

This experiment has been carried on for the past twelve years. The results of 1915 are in favour of shallow ploughing and subsoiling but the average for the period of twelve years is in favour of deep ploughing.

Two four-year rotations differing only in the treatment of the sod in preparation for corn or roots are used in this experiment, the outline being as follows:—

ROTATION "S" (SHALLOW PLOUGHING AND SUBSOILING).

First year.—Corn or roots. Field manured at rate of 24 tons per acre. Ploughed out of sod previous August, 4 inches deep, subsoiled to a depth of 8 or 9 inches, and ridged up in late autumn. The land is ploughed shallow or cultivated in preparation for the grain which follows.

Second year.—Grain. Seeded down with 10 pounds red clover and 12 pounds timothy per acre.

Third year.—Clover hay. Cut twice in the season.

Fourth year.—Timothy hay. Broken in August and prepared for corn or roots, as indicated above.

ROTATION "P" (DEEP PLOUGHING).

This rotation differs from rotation "S" only in the treatment of the timothy hayfield in preparation for corn or roots. In August, it is manured, ploughed to a depth of 7 inches, top-worked and ploughed again late fall, 7 inches deep.

SUMMARY of Costs, Returns and Net Profits of Rotations "S" and "P", 1915.

Rotation.	Cost to operate per acre.	Value of returns per acre.	Profit per acre.
	$ c.	$ c.	$ c.
S (shallow ploughing and subsoiling)	19 02	25 70	6 68
P (deep ploughing)	18 84	24 35	5 51

OTTAWA.

The following table gives the detailed results of these rotations in

ROTATION

Rotation year.	Crops.		Area.	Items of Expense								
				Rent and manure.	Seed, twine and use of machinery.	Manual labour.		Horse labour (including teamster).				
								Hours.				
						Hours.	Cost.	Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
	1914.	1915.	Ac.	$ c.	$ c.	No.	$ c.	No.	No.	No.	No.	No.
1st...	Hay.....	Corn.....	1	9 00	1 98	35·00	5 95	1·5	33·5	5·5	2·0	.....
2nd...	Corn.....	Oats	1	9 00	1 95	3·5	59	.....	2·5	5·25	·75	.....
3rd...	Oats.....	Hay.....	1	9 00	2 36	7·25	1 23	2·5	4·0	.....	.....	.....
4th...	Hay.....	Hay.....	1	9 00	2 36	4·25	72	1·5	2·0	.....	.....	.....
Aggregate.....			4	36 00	8 65	50·0	8 49	5·5	42·0	10·75	2·75	.....
Average per acre, 1915.....			.....	9 00	2 16	12·5	2 12	1·38	10·5	2·69	·69	.....

ROTATION "P"

1st....	Hay.....	Corn.....	1	9 00	1 98	35·00	5 95	1·5	31·5	5·5	2·0	.....
2nd...	Corn.....	Oats.....	1	9 00	1 95	3·5	59	.....	2·5	5·25	·75	.....
3rd...	Oats.....	Hay.....	1	9 00	2 36	7·25	1 23	2·5	4·0	.....	.....	.....
4th...	Hay.....	Hay.....	1	9 00	2 36	4·25	72	1·5	2·0	.....	.....	.....
Aggregate.....			4	36 00	8 65	50·0	8 49	5·5	40·0	10·75	2·75	.....
Average per acre, 1915.....			.....	9 00	2 16	12·5	2 12	1·38	10·0	2·69	·69	.....

1915. The values used in making the calculations are given on page 198.

"S" (shallow ploughing and subsoiling).

in raising crop.						Particulars of crop.						
						Weight.						
Value of horse labour.	Cost of threshing.	Total cost.	Cost for 1 acre.	Cost for 1 bushel.	Cost for 1 ton.	Grain.	Straw.	Hay.	Roots, ensilage or green feed.	Total value.	Value of crop per acre.	Profit or loss per acre.
$ c.	$ c.	$ c.	$ c.	Cents	$ c.	Lb.	Lb.	Lb.	Lb.	$ c.	$ c.	$ c.
15 00	.....	31 93	31 93	.....	1 98	.....	.....	.....	32,285	32 28	32 28	35
3 36	1 49	16 39	16 39	22·4	.....	2,484	3,486	.....	.....	31 81	31 81	15 42
2 03	.....	14 62	14 62	.....	4 13	.....	.....	7,075	.....	24 78	24 78	10 16
1 08	.....	13 16	13 16	.....	6 61	.....	.....	3,980	.....	13 93	13 93	77
21 47	1 49	76 10	.....	.....	.....	.....	.....	.....	.....	102 80	.....	.....
5 37	37	.....	19 02	.....	.....	.....	.....	.....	.....	.....	25 70	6 68

(deep ploughing).

14 32		31 25	31 25	....	2 07	.....	.....	.....	30,255	30 25	30 25	—1 00
3 36	1 45	16 35	16 35	22·9	.....	2,425	3,610	.....	.....	31 47	31 47	15 12
2 03	....	14 62	14 62	.....	4 50	.....	.....	6,495	.....	22 75	22 75	8 13
1 08	.....	13 16	13 16	.....	7 11	.....	.....	3,700	.....	12 95	12 95	— 21
20 79	1 45	75 38	.....	.....	.....	.....	.....	.....	.....	97 42	.....	.....
5 20	36	.....	18 84	.....	.....	.....	.....	.....	.....	.....	24 35	5 51

OTTAWA.

COMMERCIAL FERTILIZERS.

This experiment has now been under way for seven years, and was designed to supply information concerning the relative fertilizing merits in regular farm rotations of:—

1. No manure or fertilizer of any kind, but pastured one year in four.
2. Barnyard manure.
3. Complete commercial fertilizer.
4. Barnyard manure, together with commercial fertilizer.

To carry out this work, 4 areas of land were selected, "N" in 1912, and "X", "Y", and "Z" in 1909. Each area was divided into four equal-sized plots, and placed under the following rotation:—

First year.—Hoed crop.

Second year.—Oats. Seeded down with 8 pounds red clover, 2 pounds alsike and 12 pounds timothy per acre.

Third year.—Clover hay.

Fourth year.—Timothy hay on rotations "X," "Y," and "Z," and pasture on rotation "N." Land ploughed shallow in early autumn, top-worked and ribbed up in late autumn.

FERTILIZER Treatment Given Rotations, "N," "X" "Y" and "Z."

Crop.	Rotation "N"	Rotation "X."	Rotation "Y"	Rotation "Z"
Mangels	No fertilizer	Manure, 15 tons	No Manure. Superphosphate, 300 lb., muriate of potash, 75 lb.; nitrate of soda, 100 lb.	Manure, 7½ tons, superphosphate 150 lb. muriate of potash, 37½ lb.; nitrate of soda, 50 lb.
Oats	No fertilizer	No fertilizer	Nitrate of soda, 100 lb	Nitrate of soda, 100 lb
Clover hay	No fertilizer	No fertilizer	Nitrate of soda, 100 lb	Nitrate of soda, 100 lb
Timothy hay	Pastured	No fertilizer	Nitrate of soda, 100 lb	Nitrate of soda, 100 lb

In calculating the returns for these rotations, fixed values as given on page 198 of this report were used. Fertilizers were valued as follows:—

Muriate of potash	$2 50 per 100 pounds.
Nitrate of soda	3 00 "
Superphosphate	.85 "

The results show a distinct advantage of barnyard manure alone over commercial fertilizer alone for this soil but point to the possibility of combining the two to good advantage when barnyard manure is scarce or high in price.

The costs, returns, and profits per acre of these rotations are given herewith for 1915:—

Rotation.	Cost to operate per acre.	Value of returns per acre.	Net profit per acre, 1915.
	$ c.	$ c.	$ c.
"N"—No manure or fertilizer of any kind	11 94	15 73	3 79
"X"—Barnyard manure	17 43	29 15	11 72
"Y"—Complete commercial fertilizer	17 90	25 88	7 98
"Z"—Barnyard manure, together with commercial fertilizer	18 89	27 14	8 25

The following table gives the results in

FERTILIZER

Rotation year.	Crops.		Area.	Items of Expense								
				Rent and manure.	Seed, twine and use of machinery.	Manual labour.		Horse labour (including teamster).				
								Hours.				
						Hours.	Cost.	Single horse	2-horse team.	3-horse team.	4-horse team.	5-horse team.
	1914.	1915.	Ac.	$ c.	$ c.	No.	$ c.	No.	No.	No.	No.	No.
1st...	Pasture	Roots	·33	1 00	0 73	22·0	3 74	1·25	5·0	1·25	1·25	.....
2nd...	Roots	Oats	·33	1 00	0 60	1·0	0 17	·25	·5	1·75	·25	.....
3rd...	Oats	Hay	·33	1 00	0 79	1·75	0 27	·25	1·0	.....	....	.....
4th...	Hay	Pasture	·33	1 00	0 59	.....	.....	.....	.....	.....	.....	.....
	Aggregate		1·32	4 00	2 71	24·75	4 18	1·75	6·5	3·0	1·5	....
	Average per acre, 1915		.....	3 03	2 05	18·75	3 17	1·32	5·0	2·27	1·13	.....

FERTILIZER

1st...	Hay	Roots	1	6 75	1 70	85·0	14 45	12·0	9·0	4·0	4·5	.....
2nd...	Roots	Oats	1	6 75	1 95	3·5	0 59	.....	3·0	5·25	·75	.....
3rd...	Oats	Hay	1	6 75	2 35	5·0	0 85	·5	3·0	.....	.....	.....
4th...	Hay	Hay	1	6 75	2 35	5·25	0 89	1·0	2·5	.....	.....	.....
	Aggregate		4	27 00	8 35	98·75	16 78	13·5	17·5	9·25	5·25	.....
	Average per acre, 1915		.....	6 75	2 09	24·69	4 19	3·38	4·37	2·31	1·31	.....

FERTILIZER

1st...	Hay	Roots	1	7 10	1 70	86·5	14 70	12·0	9·0	4·0	4·5	.....
2nd...	Roots	Oats	1	7 10	1 91	5·0	0 85	.....	3·0	5·25	·75	.....
3rd...	Oats	Hay	1	7 10	2 35	5·0	0 85	·5	3·0	.....	.....	.....
4th...	Hay	Hay	1	7 10	2 35	6·75	1 14	1·0	2·5	.....	.....	.....
	Aggregate		4	28 40	8 31	103·25	17 54	13·5	17·5	9·25	5·25	.....
	Average per acre, 1915		....	7 10	2 08	25·81	4 38	3·38	4·37	2·31	1·31	.....

FERTILIZER

1st...	Hay	Roots	1	8 05	1 70	86·5	14 70	12·0	9·0	4·0	4·5	.....
2nd...	Roots	Oats	1	8 05	1 91	5·0	0 85	.....	3·0	5·25	·75	.....
3rd...	Oats	Hay	1	8 05	2 35	5·0	0 85	·5	3·0	.....	.....	.....
4th...	Hay	Hay	1	8 05	2 35	6·75	1 14	1·0	2·5	.....	.....	.....
	Aggregate		4	32 20	8 31	103·25	17 54	13·5	17·5	9·25	5·25	.....
	Average per acre, 1915		.....	8 05	2 08	25·81	4 38	3·38	4·37	2·31	1·31	.....

detail for the foregoing rotations:—

ROTATION "N."

in raising Crop.						Particulars of Crop.						
						Weight.						
Value of horse labour.	Cost of threshing.	Total cost.	Cost for 1 acre.	Cost for 1 bushel.	Cost for 1 ton.	Grain.	Straw.	Hay.	Roots, ensilage or green feed.	Total value.	Value of crop per acre.	Profit or loss per acre.
$ c.	$ c.	$ c.	$ c.	Cents	$ c.	Lb.	Lb.	Lb.	Lb.	$ c.	$ c.	$ c.
3 15	.....	8 62	25 86	4·63	1 54	.....	.....	.....	11,175	11 18	33 54	7 68
1 08	0 24	3 09	9 27	26·6	.....	395	405	.....	.....	4 76	14 28	5 01
0 41	.....	2 47	7 41	.....	5 49	.....	.....	900	.....	3 15	9 45	2 04
.....	.....	1 59	4 77	.....	.....	.....	.....	.....	.....	1 67	5 00	0 23
4 64	0 24	15 77	.....	.....	.....	.....	.....	.....	.....	20 76	.....	.....
3 51	0 18	.....	11 94	.....	.....	.....	.....	.....	.....	.....	15 73	3 79

ROTATION "X."

10 10	.....	33 00	33 00	4·8	1 61	.....	.....	.....	41,075	41 08	41 08	8 03
3 53	1 67	14 49	14 49	17·6	.....	2,796	2,529	.....	.....	33 02	33 02	18 53
1 16	.....	11 11	11 11	.....	4 21	.....	.....	5,285	.....	18 48	18 48	7 37
1 12	.....	11 11	11 11	.....	3 24	.....	.....	6,865	.....	24 01	24 01	12 90
15 91	1 67	69 71	.....	.....	.....	.....	.....	.....	.....	116 59	.....	.....
3 98	0 42	.....	17 43	.....	.....	.....	.....	.....	.....	.....	29 15	11 72

ROTATION "Y."

10 10	.....	33 60	33 60	5·4	1 80	.....	.....	.....	37,275	37 28	37 28	3 63
3 53	1 43	14 82	14 82	21·1	.....	2,388	2,024	.....	.....	27 93	27 93	13 11
1 16	.....	11 46	11 46	.....	4 81	.....	.....	4,760	.....	16 66	16 66	5 20
1 12	.....	11 71	11 71	.....	3 79	.....	.....	6,185	.....	21 63	21 63	9 92
15 91	1 43	71 59	.....	.....	.....	.....	.....	.....	.....	103 50	.....	.....
3 98	0 36	.....	17 90	.....	.....	.....	.....	.....	.....	.....	25 88	7 98

ROTATION "Z."

10 10	.....	34 55	34 55	5·7	1 89	.....	.....	.....	36,475	36 48	36 48	1 93
3 53	1 59	15 93	15 93	20·4	.....	2,653	2,082	.....	.....	30 69	30 69	14 76
1 16	.....	12 41	12 41	.....	4 83	.....	.....	5,150	.....	17 99	17 99	5 58
1 12	.....	12 66	12 66	.....	3 79	.....	.....	6,690	.....	23 41	23 41	10 75
15 91	1 59	75 55	.....	.....	.....	.....	.....	.....	.....	108 57	.....	.....
3 98	0 40	.....	18 89	.....	.....	.....	.....	.....	.....	.....	27 14	8 25

EXPERIMENTAL STATION FOR PRINCE EDWARD ISLAND, CHARLOTTETOWN, P.E.I.

REPORT OF THE SUPERINTENDENT, J. A. CLARK, B.S.A.

SEASONAL NOTES.

Only two brief cold waves occurred during the winter of 1914-15. The first came at Christmas and lasted about one week. The snow then disappeared until the second cold wave came, about the first of February, and was followed by very mild weather which continued for the balance of the winter. The frost was entirely out of the ground for short periods of time during both January and February, and the heavy blanket of snow that fell late in March protected the fields from surface heaving, and gave the grasses and clovers a splendid early start. However, large bodies of ice about the island retarded growth during April and May, being cold and wet, the trees did not appear green until May 27. Nevertheless no June frosts occurred at this Station and there was wonderfully rapid plant growth during July and satisfactory harvest weather during August and September.

Some Weather Observations taken at Charlottetown Experimental Station, 1915.

	Temperature F.			Precipitation.				Total
	Highest.	Lowest.	Mean.	Rainfall.	Snowfall.	Total.	Heaviest in 24 hours.	Sunshine.
	°	°	°	Inches.	Inches.	Inches.	Inches.	Hours.
January	48	−14	21·58	2·62	27	5·32	1·05	72·4
February	49	−13	22·624	1·54	8	2·34	·58	94·6
March	45	10	25·774	.....	23·5	2·35	·5	86·4
April	57	20	37·55	1·80	7	2·5	·4	140·9
May	68	31	44·742	3·97	.....	3·97	1·09	160·1
June	77	35	54·767	3·13	.....	3·13	·79	195·5
July	81	42	63·645	1·95	.....	1·95	·7	238·9
August	81	42	63·645	2·22	.....	2·22	·62	203·3
September	80	35	57·233	3·98	.....	3·98	·9	169·9
October	67	31	47·667	3·83	.....	3·83	1·66	145·1
November	54	21	38·48	4·51	.....	4·51	1·19	58·6
December	50	11	29·71	6·64	13·1	7·35	1·77	48·1
Total for year				35·59	78·6	43·45	.....	1,613·8
Average for seven years				32·73	101·81	42·87	.....	1,865·5
Total for six growing months, April to September.				17·05	7	17·75	.....	1,108·6
Average for six growing months, April to September				17·71	11·25	18·83	.....	1,269·8

The principal farm operations were begun and finished on the following dates:—

——	Began.	Finished.
Rolling meadows	April 28	April 29
Seeding lawns	April 30	May 14
Preparation for field crops	May 11	July 10
Spraying orchard	May 7	June 28
Spraying potatoes for blight	July 13	September 11
Seeding wheat	May 17	May 26
Seeding oats	May 15	June 12
Seeding barley	May 26	June 15
Seeding clover and grasses	May 15	June 19
Seeding alfalfa	June 19	June 25
Seeding corn	May 31	June 1
Seeding buckwheat	July 12	July 25
Seeding mangels	May 26	June 4
Seeding turnips	May 24	June 15
Seeding potatoes	May 24	July 7
Cutting clover	July 12	August 12
Second cutting clover	September 17	September 17
Cutting timothy	July 16	August 12
Cutting wheat	September 3	September 13
Cutting oats	August 21	September 16
Cutting barley	September 1	September 7
Cutting corn	October 1	October 4
Harvesting mangels	October 18	October 26
Harvesting turnips	November 12	November 15
Harvesting potatoes	August 21	October 22
Threshing	September 9	October 27
Ploughing	April 27	December 27
Summer ploughing of sod	August 19	September 28
Autumn ploughing of stubble	September 28	October 13
Autumn ridging of cultivated land	November 15	November 26
Cultivating for hoed crops	June 24	July 23
"Freeze-up"	. . . . .	December 12

CROP YIELDS.

The season, though unusual in many respects, has given the largest average yields of field crops yet recorded at Charlottetown. Promising varieties and registered strains of grain and potatoes were multiplied for seed purposes. This seed is sold direct to the farmers of the province. The following crops were grown on the rotations and fields during the season of 1915:—

FIELD Crop Areas and Yields, Charlottetown, 1915.

Crop.	Preceding crop.	Acreage.	Total yield.		Yield per acre.	
			bush.	lb.	bush.	lb.
Wheat, Marquis	Turnips (Rotation B—4)	1·00	25 "	55 "	25 "	55 "
Wheat, Marquis	Potatoes (Rotation D—2)	1·00	27 "	30 "	27 "	30 "
Wheat, Early Red Fife	Potatoes (Rotation C—3)	·57	23 "	43 "	41 "	36 "
Wheat, White Fife	Potatoes (Rotation G—7)	·4	14 "	13 "	35 "	52 "
Oats, Banner	Mangels (Rotation A—4)	1·00	82 "	—	82 "	—
Oats, Banner	Hay (Rotation B—1)	1·00	60 "	30 "	60 "	30 "
Oats, Banner	Mixed Grain (Rotation C—4)	6·00	360 "	6 "	60 "	1 "
Oats, O.A.C. 72	Turnips (Rotation F—3)	·86	58 "	7 "	67 "	22 "
Oats, Victory	Hay (Rotation G—5)	·4	23 "	31 "	59 "	26 "
Barley, O.I.2-row	Hay (Rotation A—2)	1·00	54 "	43 "	54 "	43 "
Barley, Manchurian	Hay (Rotation F—1)	·86	37 "	3 "	43 "	4 "
Potatoes, Green Mountain	Hay Potation B—3)	·5	151 "	10 "	302 "	20 "
Irish Cobbler	Hay (Rotation B—3)	·5	128 "	43 "	257 "	26 "
Irish Cobbler	Oats (Rotation G 6)	·4	148 "	30 "	371 "	15 "
Turnips	Hay (Rotation D—1)	1·00	24 tons	1,825 "	24 tons.	1,825 "
Turnips	Barley (Rotation F—2)	·86	20 "	955 "	23 "	1,622 "
Mangels	Barley (Rotation A—3)	1·00	24 "	1,847	24 "	1,847 "
Mangels	Hay (Rotation C—1)	·57	13 "	234 "	23 "	24 "
Corn Stover	Oats (Rotation C—3)	·5	6 "	535 "	12 "	1,110 "
Clover Hay	Oats (Rotation A—5)	1·00	3 "	95 "	3 "	95 "
Clover Hay	Oats (Rotation B—2)	1·00	—	1,594 "	—	1,594 "
Clover Hay	Wheat (Rotation B—5)	1·00	2 "	465 "	2 "	465 "
Clover Hay	Oats (Rotation C—4)	·57	1 "	1,390 "	2 "	1,947 "
Clover Hay	Wheat (Rotation D—3)	1·00	1 "	780 "	1 "	780 "
Clover Hay	Wheat (Rotation F—4)	·86	1 "	1,155 "	1 "	1,660 "
Clover Hay	Oats (Rotation G—1)	·4	1 "	840 "	3 "	1,100 "
Timothy Hay	Clover (Rotation A—1)	1·00	2 "	1,800 "	2 "	1,800 "
Timothy Hay	Clover (Rotation C—1)	·57	2 "	——	3 "	1,017 "
Timothy Hay	Clover (Rotation G—2)	·4	1 "	150 "	2 "	1,375 "
Timothy Hay	Mixed Hay (Rotation G—3)	·4	—	1,770 "	2 "	425 "
Timothy Hay	Timothy (Rotation G—4)	·4	—	1,780 "	2 "	450 "
Timothy Hay	Timothy (Rotation C—1)	4·5	8 "	375 "	1 "	1,638 "
Timothy Hay	Oats (Rotation F—1)	2·00	4 "	1,330 "	2 "	665 "

COST OF PRODUCTION OF FIELD CROPS.

The data on the cost of production of the various crops have been compiled from the records kept in connection with the rotation experiments. By careful handling, the land is now more uniform than it was when previously reported upon. The average for two years is given here, but much more valuable data will be available after several years' work.

The values are those that have been fixed for the rotation work on all the eastern Experimental Stations. Owing to the exceptional conditions in 1915, due to the war, many of these were much below the market price. These values are given on page 219 of this report.

Cost of Production of Wheat after Turnips.

Number of acres, 1.

Preceding crops: (Rotation B) hay, oats, hay, turnips.

Rent of land at $3 per acre	$ 3 00
Share of manure at rate of 25 tons per acre at $1 per ton	5 00
Use of machinery at 60 cents per acre	60
Seed	1 00
Twine, 2½ pounds at 11 cents per pound	27
Ploughing in autumn, 3½ hours, 2-horse team at 34 cents	1 10
Discing in spring, 1½ hours, 3-horse team at 41 cents	61
Harrowing, 1½ hours, 2-horse team at 34 cents	37
Rolling, ½ hour 2-horse team at 34 cents	11
Sowing, ¾ hour, 2-horse team at 34 cents	25
Cutting, 1 hour, 3-horse team	41
Stooking, 2 hours manual labour at 17 cents	34
Loading and unloading, 1½ hours manual labour at 17 cents	25
Hauling, ⅝ hour, 2-horse team at 34 cents	23
Threshing, 6 hours manual labour at 17 cents	1 02
Storing, ½ hour manual labour at 17 cents	09
Cost per acre	$14 65

Yield of grain per acre, 1,555 pounds or 25 bushels, 55 pounds.
Yield of straw per acre, 3,910 pounds or 1 ton, 1,910 pounds.
Valuing the straw at $4 per ton, the cost to produce 1 bushel of grain was 26·4 cents.
From two years' data, the average cost to produce 1 bushel of grain was 26·7 cents.

Cost of Production of Barley after Hay.

Number of acres, 1.

Preceding crops: (Rotation A) oats, mangels, hay, hay.

Rent of land at $3 per acre	$ 3 00
Share of manure at rate of 25 tons per acre at $1 per ton	5 00
Use of machinery at 60 cents per acre	60
Seed	1 00
Twine, 3½ pounds at 11 cents per pound	38
Ploughing in summer, 2¼ hours, 2-horse team at 34 cents	76
Harrowing in autumn, 7½ hours, 2-horse team at 34 cents	2 68
Ribbing up in autumn, 1¾ hours, 2-horse team at 34 cents	59
Discing in spring, ⅝ hours, 2-horse team at 34 cents	23
Harrowing, 1½ hours, 2-horse team at 34 cents	65
Rolling, ⅓ hour, 2-horse team at 34 cents	12
Sowing, ¾ hours, 2-horse team at 34 cents	25
Cutting, 1 hour, 3-horse team at 41 cents	41
Stooking, 2 hours manual labour at 17 cents	34
Loading and unloading, 2¼ hours manual labour at 17 cents	39
Hauling, 1½ hours, 2-horse team at 34 cents	42
Threshing, 4 hours manual labour at 17 cents	68
Storing, ½ hour manual labour at 17 cents	09
Cost per acre	$17 59

Yield of grain per acre, 2,635 pounds or 54 bushels, 43 pounds
Yield of straw per acre, 3,055 pounds or 1 ton, 1,055 pounds.
Valuing the straw at $4 per ton, the cost to produce 1 bushel of grain was 21 cents.
From two years' data, the average cost to produce 1 bushel of grain was 22½ cents.

CHARLOTTETOWN.

Cost of Production of Oats following Mangels.

Number of acres, 1.

Preceding crops: (Rotation A) hay, hay, barley, mangels.

Rent of land at $3 per acre	$ 3 00
Share of manure at rate of 25 tons per acre at $1 per ton	5 00
Use of machinery at 60 cents per acre	60
Seed	1 00
Twine, 3·8 pounds at 11 cents per pound	42
Ploughing in autumn, 2-horse team, 2½ hours at 34 cents	85
Harrowing in autumn, 2-horse team, 1¼ hours at 34 cents	42
Discing in spring, 3-horse team, 1¼ hours at 41 cents	51
Harrowing, 2-horse team, 1½ hours at 34 cents	51
Rolling, 2-horse team, ¼ hour at 34 cents	08
Sowing, 2-horse team, ¾ hour at 34 cents	26
Cutting, 3-horse team, 1 hour at 41 cents	41
Stooking, 3 hours manual labour at 17 cents	51
Loading and unloading, 2½ hours manual labour at 17 cents	43
Hauling, 2-horse team, 1 hour	34
Storing, ½ hour manual labour at 17 cents	08
Threshing, 6 hours manual labour at 17 cents	1 02
Cost per acre	$15 44

Yield of grain per acre, 2,788 pounds or 82 bushels.
Yield of straw per acre, 3,887 pounds or 1 ton, 1,887 pounds.
Valuing the straw at $4 per ton, the cost to produce 1 bushel of grain was 9·35 cents.
From two years' data, the average cost to produce 1 bushel of grain was 8·67 cents.

Cost of Production of Mangels after Barley.

Number of acres, 1.

Preceding crops: (Rotation A) oats, hay, hay, barley.

Rent of land at $3 per acre	$ 3 00
Share of manure at rate of 25 tons per acre at $1 per ton	5 00
Use of machinery at 60 cents per acre	60
Seed, 3 pounds at 35 cents per pound	1 05
Seed, clover and alsike sown 1914 for fertilizing purposes	2 22
Ploughing in autumn, 1¾ hours, 3-horse team, at 41 cents	72
Harrowing in autumn, 6¾ hours, 2-horse team at 34 cents	2 27
Ribbing in autumn, 1¾ hours, 2-horse team at 34 cents	58
Harrowing, 5 hours, 2-horse team at 34 cents	1 70
Discing in spring, 1⅞ hours, 3-horse team at 41 cents	68
Ridging, 2 5/12 hours, 2-horse team at 34 cents	68
Rolling, 1 hour, 2-horse team, at 34 cents	34
Sowing, 8 hours manual labour at 17 cents per hour	1 36
Singling and hoeing, 108 hours manual labour at 17 cents	18 36
Cultivating, 7½ hours, 1-horse team at 27 cents	2 03
Loading, pulling, topping, 34 hours manual labour at 17 cents	5 95
Hauling, 15 hours, 1-horse team at 27 cents	4 05
Storing, 10 hours manual labour at 17 cents per hour	1 70
Cost per acre	$52 49

Yield of roots per acre, 24 tons, 1,847 pounds or 830 bushels, 47 pounds.
Cost to produce 1 ton, $2.09.
From two years' data, the average cost to produce 1 ton was $2.65½.
Cost to produce 1 bushel, 6 cents.
From two years' data, the average cost to produce 1 bushel was 7·9 cents.

Cost of Production of Turnips after Hay.

Number of acres, 1.

Preceding crops: (Rotation D), wheat, hay.

Rent of land at $3 per acre	$ 3 00
Share of manure at rate of 25 tons per acre at $1 per ton	5 00
Use of machinery at 60 cents per acre	60
Seed, 2 pounds at 30 cents	60
Ploughing in autumn, 3 hours, 2-horse team at 34 cents	1 02
Harrowing in autumn, 3 hours, 2-horse team at 34 cents	1 02
Picking stones in autumn, 2 hours manual labour at 17 cents	34
Discing in spring, 1½ hours, 3-horse team at 41 cents	61
Harrowing, 7¾ hours, 2-horse team at 34 cents	2 63
Rolling, 3 times, 1 hour, 2-horse team at 34 cents	34
Ridging, 1½ hours, 2-horse team at 34 cents	51
Sowing, 2 hours manual labour at 17 cents	34
Singling and hoeing, 69½ hours manual labour at 17 cents	11 81
Cultivating, 6¾ hours, 1-horse team at 27 cents	1 82
Pulling, topping, loading, 30 hours manual labour at 17 cents	5 10
Hauling, 15 hours, 1-horse team at 27 cents	4 05
Storing, 10 hours manual labour at 17 cents	1 70
Harrowing autumn of 1914, ¾ hour, 3-horse team at 41 cents	31
Cost per acre	$40 80

Yield of roots per acre, 24 tons, 1,825 pounds, or 830 bushels, 25 pounds.
Cost to produce 1 ton, $1.64.
" " 1 bushel, 4·9 cents.
From two years' data, the average cost to produce 1 ton was $1.83.
" " " " " " 1 bushel was 5·45 cents.

Cost of Production of Potatoes after Clover Hay.

Number of acres, 1.

Preceding crops: (Rotation B), wheat, hay, oats, hay.

Rent of land at $3 per acre	$ 3 00
Share of manure at rate of 25 tons per acre at $1 per ton	5 00
Use of machinery at 60 cents per acre	60
Seed, 20 bushels at 50 cents per bushel	10 00
Ploughing and ribbing in autumn, 5 hours, 2-horse team at 34 cents	1 70
Harrowing in autumn, 5⅝ hours, 2-horse team at 34 cents	1 95
Discing in spring, 1½ hours, 3-horse team at 41 cents	51
Harrowing in spring, 2 hours, 2-horse team at 34 cents	68
Rolling, ⅔ hour, 2-horse team at 34 cents	22
Cutting sets, 8⅚ hours, manual labour at 17 cents	1 50
Planting, 2 hours, 2-horse team at 34 cents	68
" 2 " manual labour at 17 cents	34
Spraying, 2¼ hours, 2-horse team at 34 cents	80
Spray, 7 applications (Bordeaux and Paris green)	5 95
Hoeing, 10 hours manual labour at 17 cents	1 70
Cultivating, 6 hours, 1-horse team at 27 cents	1 62
" 4⅔ hours, 2-horse team at 34 cents	1 59
Picking potatoes, 40 hours manual labour at 17 cents	6 80
Digging and harrowing, 2⅚ hours, 2-horse team at 34 cents	88
Hauling, 4 hours, 1-horse team at 27 cents	1 08
Storing, 14 hours manual labour at 17 cents	2 38
Cost per acre	$48 98

Yield of potatoes per acre, 8 tons, 793 pounds or 279 bushels, 53 pounds.
Cost to produce 1 ton, $5.85.
" " 1 bushel, 17·56 cents.
From two years' data the average cost to produce 1 ton was $6.19.
" " " " " " 1 bushel was 18·58 cents.

Cost of Production of Hay after Wheat.

Number of acres, 1.

Preceding crops: (Rotation B), oats, hay, turnips, wheat.

Rent of land at $3 per acre	$ 3 00
Share of manure at rate of 25 tons per acre at $1 per ton	5 00
Use of machinery at 60 cents per acre	60
Charges on 12 pounds of timothy at 12 cents, 10 pounds red clover at 22 cents, 2 pounds alsike at 23 cents	3 86
Cutting, 1½ hours, 2-horse team at 34 cents	51
Coiling and shaking out, 4 hours, manual labour at 17 cents	68
Raking, ⅔ hour, with 2-horse team at 34 cents	23
Loading, 1 hour, 2-horse team, 2 hours manual labour at 17 cents	68
Unloading, ¾ hour, 2-horse team and 1¼ hours manual labour	29
Cost per acre	$14 85

Yield of hay per acre, 2 tons, 465 pounds.
Cost to produce 1 ton, $6.65.
From two years' data, the average cost to produce 1 ton was $7.14.

Cost of Production of Hay after Oats.

Number of acres, 1.

Preceding crops: (Rotation A) oats, barley, mangels, oats.

Rent of land at $3 per acre	$ 3 00
Share of manure at rate of 25 tons per acre, at $1 per ton	5 00
Use of machinery at 60 cents per acre	60
One-half of the charges on 12 pounds of timothy at 10 cents; 10 pounds red clover at 22 cents, and 2 pounds alsike at 23 cents	1 93
Cutting, 1 hour, 2-horse team at 34 cents	34
Coiling and shaking out, 9½ hours manual labour at 17 cents	1 61
Raking, ⅔ hour, 2-horse team at 34 cents	23
Loading, ⅝ hour, 2-horse team at 34 cents; 3 hours manual at 17 cents	5 80
Unloading, ½ hour, 2-horse team, 2 hours manual	45
Cost per acre	$13 96

Yield of hay per acre, 3 tons, 95 pounds.
Cost to produce 1 ton, $4.58.
From 2 years' data, the average cost to produce 1 ton was $4 87.

The following table gives a summary of the cost of production of wheat, oats, barley, mangels, turnips, potatoes, and hay. In computing the values of the cereals the straw was valued at $4 per ton.

Cost of Production of Field Crops, Charlottetown, P.E.I., 1915.

Crop.	Area.	Yield per acre.		Cost to produce.		
	Acres	Tons. lb.	Bush. lb.	Per acre.	Per ton.	Per bush.
				$ cts.	$ cts.	Cents.
Wheat	1	.....	25 55	14 65	.....	26·4
Oats	1	.....	82 00	15 44	.....	9·35
Barley	1	.....	54 43	17 59	.....	21·
Mangels	1	24 1,847	830 47	52 49	2 10	6·32
Turnips	1	24 1,825	830 25	40 80	1 64	4·9
Potatoes	1	8 793	279 53	48 98	5 83	17·5
Hay after wheat	1	2 465	.....	14 85	6 65	.....
Hay after oats	1	3 95	.....	13 96	4 58	.....

CHARLOTTETOWN.

SESSIONAL PAPER No. 16

ROTATION OF CROPS.

A systematic rotation of crops has proved to be of great benefit wherever adopted in the province. A few of the advantages are here mentioned:—

(*a*) By this system adequate preparation can be made for any crop one, two, or more years previous to its growth.

(*b*) Rotations may be planned to meet the requirements of any special line of farm work, for example, to supply sufficient suitable feed for a dairy herd.

(*c*) The eradication or control of many noxious weeds can be easily accomplished by adopting a special rotation for a limited time, based on the life history of the weed.

(*d*) The control of certain plant diseases may be greatly assisted by the use of a rotation that prevents the natural multiplication of the disease.

(*e*) Clover may be made almost as sure a crop as any other if the rotation is arranged so that clover is grown without a break of more than one year from clover sod to the next clover seeding.

(*f*) With a definite rotation system a plan of all farm work can be arranged to save time, labour and needless farm fences.

To meet a number of the requirements in this province, the following rotations were laid out in 1912:—

ROTATION "A" (FIVE YEARS' DURATION).

First year.—Hoed crop. Twenty-five tons of manure are used in preparation for this crop, about one-half being applied the previous autumn after the grain crop is harvested, the land being ridged for winter.

Second year.—Grain. Seeded down with 10 pounds of red clover, 2 pounds of alsike, and 12 pounds of timothy per acre.

Third year.—Clover hay. During the late season of 1915, by using early red clover and cutting the clover on July 26, a second crop of clover was harvested on September 23.

Fourth year.—Timothy hay or pasture. Broken in August and top-worked during autumn.

Fifth year.—Grain. Two bushels of barley and 8 pounds of red clover were sown to the acre, and the clover ploughed under with a dressing of manure in the autumn. The clover was sown for fertilizing purposes and to assist in the propagation and conservation of clover bacteria.

The above rotation provides a large supply of suitable food for live stock.

ROTATION "B" (FIVE YEARS' DURATION).

This rotation is similar to "A" as to crops grown, but is planned so as to control ox-eye daisy and other perennial weeds.

First year.—Hoed crop. Potatoes were grown in 1915, spring-manured at the rate of 15 tons per acre.

Second year.—Grain. Seeded down with 10 pounds red clover, 2 pounds alsike, and 6 pounds timothy per acre.

Third year.—Clover hay. Ploughed in autumn.

Fourth year.—Grain. Seeded down with 10 pounds of red clover, 2 pounds of alsike, and 12 pounds of timothy per acre.

Fifth year.—Clover hay or pasture. Top-dressed in early autumn and ploughed in preparation for hoed crop.

This rotation destroys many bad weeds and after it has been in operation a few years can easily be extended another year or two to provide timothy hay or pasture.

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ROTATION "C" (FOUR YEARS' DURATION).

Suitable for a stock-farm as it produces relatively more roots and hay and less grain than the former ones, the proportions being about right where the rough farm products are all fed to the stock.

First year.—Hoed crop. Mangels grown in 1915. Spring-manured with 10 tons of well rotted manure per acre.

Second year.—Grain. Seeded down with 10 pounds of red clover, 2 pounds of alsike, and 12 pounds of timothy per acre.

Third year.—Clover hay.

Fourth year.—Timothy hay or pasture. A good sprinkling of clover came in this field in 1915. Ten tons of manure per acre were applied in the early autumn and ploughed down in preparation for mangels.

ROTATION "D" (THREE YEARS' DURATION).

This rotation is suitable for a stock farm that has a lot of rough pasture land. It will supply a large quantity of rough forage and grain and is probably the best rotation for the destruction of the following perennial weeds: ox-eye daisy, yarrow, sow-thistle, Canadian thistle, and couch grass.

First year.—Hoed crop. Turnips in 1915, spring-manured with 10 tons of barnyard manure per acre.

Second year.—Grain. Wheat in 1915, seeded down with 10 pounds red clover, 2 pounds alsike, and 6 pounds timothy, per acre.

Third year.—Clover hay, cut early. A second crop was cut from the aftermath in 1915. The land was then given a dressing of 10 tons of manure per acre, ploughed and worked in preparation for the hoed crop.

On account of the small amount of rough pasture land in Prince Edward Island this rotation may be used only for a time on very weedy fields to clean them after which it may be changed to another rotation such as "C" by the addition of a year of pasture, after the hay.

ROTATION "F" (FOUR YEARS' DURATION).

This rotation will destroy many weeds and may be used for the production of large quantities of grain for seed purposes.

First year.—Hoed crop. Turnips were grown in 1915, spring-manured at the rate of 12 tons of manure per acre, which was placed in drills directly under the turnip plants and covered with about six inches of soil. It was hoped that by doing this, injury from club root might be avoided. The results would indicate that this method was partially successful.

Second year.—Grain. Oats were grown here in 1915. The field was seeded down with 10 pounds red clover, 2 pounds alsike, and 6 pounds timothy, per acre.

Third year.—Clover hay. Top-dressed with 8 tons of manure in the autumn before ploughing.

Fourth year.—Grain. Barley sown in 1915, seeded down with 8 pounds red clover and 2 pounds alsike per acre.

ROTATION "G" (SEVEN YEARS' DURATION).

This rotation has been very generally followed in Prince Edward Island. Clover should be sown with the grain crop following the breaking of the sod, which is to a great extent, a natural grass sod, in order to obtain a fair prospect of getting a crop of clover the fourth year of the rotation.

CHARLOTTETOWN.

First year.—Oats. Seeded down with 8 pounds red clover and 2 pounds alsike per acre.

Second year.—Hoed crop. Potatoes were grown in 1915, spring-manured at the rate of 20 tons per acre.

Third year.—Grain. Wheat grown in 1915, seeded down with 10 pounds red clover, 2 pounds alsike and 12 pounds timothy per acre.

Fourth year.—Clover hay.

Fifth year.—Timothy hay. Top-dressed in August with 15 tons of manure per acre.

Sixth year.—Pasture.

Seventh year.—Pasture.

It is believed that plant diseases affecting hoed crops are checked or destroyed by the use of a long rotation similar to this one.

The following fixed values are being used in this and similar work in all the eastern Farms and Stations:—

COST VALUES.

Manual labour	per hour.	$0 17
Horse labour, including teamster—		
Single horse	"	27
2-horse team	"	34
3-horse team	"	41
Additional horses each	"	07
Rent	per acre.	3 00
Machinery (inclusive of threshing machinery)	"	60
Barnyard manure (spread)	"	1 00
Commercial fertilizers charged at cost.		
Seed wheat oats, barley, buckwheat and rye	"	1 00
Seed peas	"	2 00
Turnip, mangel, potato and corn seed charged at cost.		
Grass and clover seed charged at cost, total cost to be distributed over the number of years in hay and pasture.		
Twine charged at cost.		
Threshing charged according to actual labour expended, the items charged under this head to include only such operations as begin after the load of grain arrives at the feed table, or after the grain is stacked or placed in the mow ready to be thrown on the feed table. Loading, hauling, etc., to be charged to manual and horse labour.		

RETURN VALUES.

Wheat, oats, barley, rye and buckwheat	per pound	$0 01
Peas	"	01¼
Hay (timothy, clover, alfalfa or mixed)	per ton	7 00
Straw (wheat, oats, barley, rye, buckwheat or peas)	"	4 00
Corn ensilage	"	2 00
Sugar beets	"	3 00
Forage crops (green)	"	2 00
Turnips, carrots, mangels	"	2 00
Potatoes	per bushel.	50
Pasture—		
Horses, per head	per month.	1 00
Cattle "	"	1 00
Sheep "	"	25

The items for which there are no fixed charges were valued, in 1915, as follows:—

Twine	per pound	$0 11
Red clover	"	22
Alsike clover	"	23
Timothy	"	10
Mangel seed	"	30
Turnip seed	"	30

CHARLOTTETOWN.

ROTATION

Rotation year.	Crops.		Area.	Items of Expense								
				Rent and manure.	Seed, twine and use of machinery.	Manual labour..		Horse labour (including teamster).				
								Hours.				
						Hours.	Cost.	Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
	1914.	1915.	Ac.	$ c.	$ c.	No.	$ c.	No.	No.	No.	No.	No.
4th...	Hay	Hay	1	8 00	2 86	15	2 55	.....	$2\frac{7}{12}$	.....	.....	.....
5th...	Hay	Barley	1	8 00	1 98	$4\frac{3}{4}$	80	.....	$16\frac{8}{8}$	1	.....	.....
1st....	Barley	Mangels	1	8 00	3 87	161	27 37	$22\frac{1}{2}$	17	$3\frac{8}{12}$	.....	.....
2nd...	Mangels	Oats	1	8 00	2 02	6	1 02	.....	$7\frac{1}{4}$	$2\frac{1}{4}$	.....	.....
3rd...	Oats	Hay	1	8 00	2 53	$14\frac{1}{2}$	2 47	.....	$2\frac{8}{8}$	.....	.....	.....
	Aggregate		5	40 00	13 26	$201\frac{1}{4}$	34 21	$22\frac{1}{2}$	$46\frac{1}{2}$	$6\frac{3}{3}$	.....	.....
	Average per acre, 1915		.....	8 00	2 65	$40\frac{1}{5}$	6 84	$4\frac{2}{5}$	$9\frac{3}{10}$	$1\frac{1}{2}$	.....	.....

ROTATION

4th....	Hay	Oats	1	8 00	1 86	4	68	.....	$5\frac{3}{4}$	1	.....	.....
5th...	Oats	Hay	1	8 00	3 86	8	1 36	.....	$2\frac{1}{3}$	.....	.....	.....
1st....	Hay	Potatoes	1	8 00	*5 95							
					12 10	66	11 22	10	$23\frac{1}{8}$	$2\frac{3}{4}$	.....	.....
2nd...	Turnips	Wheat	1	8 00	1 87	4	68	.....	$2\frac{8}{8}$	$2\frac{1}{2}$	.....	.....
3rd....	Wheat	Hay	1	8 00	4 46	$7\frac{1}{4}$	1 23	.....	$3\frac{8}{12}$	.....	.....	.....
	Aggregate		5	40 00	30 10	$89\frac{1}{4}$	15 17	10	$37\frac{1}{2}$	$6\frac{1}{4}$	.....	.....
	Average per acre, 1915		.....	8 00	6 02	18	3 03	2	$5\frac{1}{2}$	.....	.....	.....

*Spray material.

ROTATION

4th...	Hay	Hay	·57	4 56	1 63	3	51	$\frac{1}{4}$	$1\frac{1}{2}$	.....	.....	.....
1st....	Hay	Mangels	·57	4 56	94	$89\frac{1}{2}$	15 21	$12\frac{1}{2}$	$12\frac{1}{2}$	$1\frac{1}{2}$	.....	.....
2nd...	Potatoes	Wheat	·57	4 56	1 13	$2\frac{1}{2}$	42	.....	$4\frac{7}{12}$	$\frac{1}{4}$	.....	.....
3rd...	Oats	Hay	·57	4 56	1 44	$3\frac{3}{4}$	63	$\frac{1}{4}$	$2\frac{1}{12}$	.....	.....	.....
	Aggregate		2·28	18 24	5 14	$98\frac{3}{4}$	16 77	13	$20\frac{3}{3}$	$1\frac{8}{8}$	.....	.....
	Average per acre, 1915		.....	8 00	2 25	43·3	7 35	6	9	·8	.....	.....

ROTATION

1st....	Hay	Turnips	1	8 00	1 20	$113\frac{1}{2}$	19 29	$21\frac{3}{4}$	$16\frac{1}{8}$	$2\frac{1}{4}$	.....	.....
2nd...	Potatoes	Wheat	1	8 00	1 98	4	68	.....	$8\frac{5}{12}$	$1\frac{3}{8}$	.....	.....
3rd...	Wheat	Hay	1	8 00	3 86	$6\frac{1}{2}$	1 10	.....	$2\frac{3}{3}$	.....	.....	.....
	Aggregate		3	24 00	7 04	124	21 07	$21\frac{3}{4}$	$27\frac{1}{3}$	$3\frac{11}{12}$	.....	.....
	Average per acre, 1915		.....	8 00	2 35	41	7 02	7	9	1·3	.....	.....

"A." (Five years' duration.)

in raising Crop.							Particulars of Crop.						
							Weight.						
Value of horse labour.	Cost of threshing.	Total cost.	Cost for 1 acre.	Cost for 1 bushel.	Cost for 1 ton.	Height of stubble.	Grain.	Straw.	Hay.	Hoed crop.	Total value.	Value of crop per acre.	Profit or loss per acre.
$ c.	$ c.	$ c.	$ c.	cents	$ c.	Ins.	Lb.	Lb.	Lb.	Lb.	$ c.	$ c.	$ c.
88	.....	14 29	14 29	.....	4 93	3	.....	.....	5,800	.....	20 30	20 30	6 01
6 13	68	17 59	17 59	21	.....	7	2,635	3,055	.....	.....	32 46	32 46	14 87
13 25	.....	52 49	52 49	6	2 09	.....	.....	.....	.....	49,847	49 85	49 85	—2 64
3 38	1 02	15 44	15 44	9	.....	7	3,887	3,887	.....	.....	35 65	35 65	20 21
96	.....	13 96	13 96	.....	4 58	3	.....	.....	6,095	.....	21 33	21 33	7 37
24 60	1 70	113 77	.....	.....	.....	.....	.....	.....	.....	.....	159 59	.....	.....
4 92	34	.....	22 75	.....	.....	.....	.....	.....	.....	.....	.....	31 92	9 16

"B." (Five years' duration.)

2 36	68	13 58	13 58	13·2	.....	7	2,070	2,775	.....	.....	26 25	26 25	12 67
79	.....	14 01	14 01	....	17 57	3	.....	.....	1,594	.....	5 58	5 58	—8 43
11 71	.....	48 98	48 98	17·5	.....	.....	.....	.....	.....	16,793	139 94	139 94	90 96
3 03	1 02	14 65	14 65	26·4	.....	7	1,555	3,910	.....	.....	23 36	23 36	8 71
1 16	.....	14 85	14 85	.....	6 65	3	.....	.....	4,465	.....	15 63	15 63	78
19 10	1 70	106 07	.....	.....	.....	.....	.....	.....	.....	.....	210 76	.....	.....
3 82	34	.....	21 21	.....	.....	.....	.....	.....	.....	.....	.....	42 15	20 94

"C." (Four years' duration.)

44	.....	7 14	12 53	.....	3 57	3	.....	.....	4,000	.....	14 00	24 56	12 04
10 93	.....	31 63	55 49	7·25	2 40	.....	.....	.....	.....	26,234	26 23	46 02	—9 47
1 70	34	8 15	14 30	.....	.....	7	1,423	4,500	.....	.....	22 43	39 35	25 05
78	.....	7 41	13 00	.....	4 37	.....	.....	.....	3,390	.....	11 86	20 81	7 81
13 85	34	54 33	.....	.....	.....	.....	.....	.....	.....	.....	74 52	.....	.....
6 07	15	.....	23 83	.....	.....	.....	.....	.....	.....	.....	.....	32 68	8 86

"D." (Three years' duration.)

12 31	.....	40 80	40 80	4·91	1 64	.....	.....	.....	.....	49,825	49 82	49 82	9 02
3 51	51	14 71	14 71	24·3	.....	7	1,650	4,010	.....	.....	24 52	24 52	9 81
90	.....	13 86	13 86	.....	9 97	3	.....	.....	2,780	.....	9 73	9 73	—4 13
16 75	51	69 37	.....	.....	.....	.....	.....	.....	.....	.....	84 07	.....	.....
5 58	17	.....	23 12	.....	.....	.....	.....	.....	.....	.....	.....	28 02	4 90

CHARLOTTETOWN.

ROTATION

Rotation Year.	Crops. 1914.	Crops. 1915.	Area.	Items of Expense: Rent and manure.	Seed, twine and use of machinery.	Manual labour. Hours.	Manual labour. Cost.	Horse labour (including teamster.) Hours. Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
			Ac.	$ c.	$ c.	No.	$ c.	No.	No.	No.	No.	No.
4th	Hay	Barley	·86	6 88	1 69	4½	76	....	19 5/12	1¾	....	....
1st	Barley	Turnips	·86	6 88	1 04	122	20 74	21	15 5/12	2¼	....	....
2nd	Turnips	Oats	·86	6 88	1 71	4½	76	....	7½	1¾	....	....
3rd	Wheat	Hay	·86	6 88	3 55	8¼	1 42	....	3	....	....	....
	Aggregate		3·44	27 52	7 99	139½	23 68	21	45½	5¾	....	....
	Average per acre, 1915		....	8 00	2 32	40·5	6 88	6	13·2	1·7	....	....

ROTATION

4th	Oats	Hay	·4	3 20	62	4	68	....	2¼	....	....	....
5th	Hay	Hay	·4	3 20	69	3⅝	65	....	1¼	....	....	....
6th	Hay	Hay	·4	3 20	79	3½	59	....	1¼	....	....	....
7th	Hay	Hay	·4	3 20	79	3½	59	....	1¼	....	....	....
1st	Hay	Oats	·4	3 20	76	2½	42	....	10 5/12	¼	....	....
2nd	Oats	Potatoes	·4	3 20	1 48 5 12	35	5 95	4¼	16⅙	¼	....	....
3rd	Potatoes	Wheat	·4	3 20	79	2¾	47	....	4	....	....	....
	Aggregate		2·8	22 40	11 04	55½	9 35	4¼	37 11/12	½	....	....
	Average per acre, 1915		....	8 00	3 95	20	3 34	1½	13⅝	·18	....	....

"F." (Four years' duration.)

in raising Crop.							Particulars of Crop.						
							Weight.						
Value of horse labour.	Cost of threshing.	Total cost.	Cost of 1 acre.	Cost for 1 bushel.	Cost for 1 ton.	Height of stubble.	Grain.	Straw.	Hay.	Hoed crop.	Total value.	Value of crop per acre.	Profit or loss per acre.
$ c.	$ c.	$ c.	$ c.	Cents	$ c.	Ins.	Lb.	Lb.	Lb.	Lb.	$ c.	$ c.	$ c.
7 32	1 36	18 01	20 94	38	.....	7	1,779	1,986	.....	.....	21 76	25 30	4 36
11 83	..	40 49	47 08	6	1 98	.....	..	..	.....	40,955	40 95	47 61	53
3 26	1 02	13 63	15 85	15	.....	7	1,979	2,471	.....	.....	24 73	28 76	12 91
1 02		12 87	14 96		8 21	3	.....	.....	3,135	.....	10 97	12 76	−2 20
23 43	2 38	85 00	..	..	..	.....	.....	.. ..	.....	.....	98 41	.. .	.. .
6 81	69	...	24 71	..	.. ..	.....	.....	.....	.....	.....	.....	28 61	3 90

"G." (Seven years' duration.)

77	.....	5 27	13 17	.....	3 71	3	.....	.....	2,840	.....	9 94	24 85	11 68
59	.....	5 13	12 82	.....	4 77	3	.....	.....	2,150	.....	7 52	18 81	5 99
42	.....	5 00	12 50	.....	5 65	3	.....	.....	1,770	.....	6 20	15 50	3 00
42	.....	5 00	12 50	.....	5 62	3	.....	.....	1,780	.....	6 23	15 57	3 07
3 64	34	8 36	20 90	23·5	.....	7	813	1,693	.....	.....	11 52	28 80	7 90
6 64	.....	22 39	55 97	15	.....	.....	.....	.....	.....	8,910	74 25	185 62	129 65
1 46	51	6 43	16 07	22·6	.....	7	853	1,607	.....	.....	11 74	29 35	13 28
13 94	85	57 58	.....	.....	.....	.....	.....	.....	.....	.....	127 40	.....	.....
4 98	30	.....	20 56	.....	.....	.....	.....	.....	.....	.....	.....	45 50	24 94

SOIL CULTURAL EXPERIMENTS.

A series of fertilizer experiments was started in co-operation with the Chemistry Division of the Central Experimental Farm, the object of the work being to find how to obtain the largest profits from the use of fertilizers. Seventy-five plots of one-fortieth acre each in area were planted to potatoes, sixty-three of the plots being treated with fertilizers at different rates, and the remaining twelve were used as check plots at regular intervals throughout the area. The experiment included barnyard manure alone and in combination with commercial fertilizers. The potatoes were planted June 16, and the plants were sprayed regularly each week with poisoned bordeaux. The season was unfavourable, and the average yield from the sixty-three fertilizer plots was 64 bushels and 53 pounds, and from the twelve check plots, 38 bushels and 29½ pounds. This experiment will be continued for a number of years in order that reliable averages may be obtained as the soil is not uniform, as shown by the preliminary test the previous year.

Part of the area adjoining the potatoes, that had been tested with Banner oats in 1914, was again sown to Banner oats, no manure or fertilizer being used either year. The average increase in yield per acre was 6 bushels and 15 pounds over the 1914 yield. The increase was evidently due to thorough tillage and the clover that was sown with the 1914 crop, as the season was not considered as favourable as that of 1914.

The balance of the area set apart for cultural experiments was graded, levelled, and staked off into one-fortieth acre plots. These were sown with barley and seeded down with timothy and clover. Parts of this land were so poor that the barley scarcely covered the ground. Records were kept of all the plots for future reference.

The preliminary test of the whole area being completed, the following series of experiments was laid out and the land prepared for the 1916 crop:—

Outline of Cultural Experiments to be Undertaken.

No.	Experiment to determine best :—	Plots.	Rotation	Total plots.
1	Rates of seeding clover and timothy	9	4 years.	36
2	Method of applying barnyard manure	9	4 "	36
3	Method of after-harvest cultivation of sod land for grain	9	5 "	45
4	Method of seeding nurse crop for yield of hay	5	4 "	20
5	Method of seed-bed preparation	11	3 "	33
6	Rates of seeding nurse crop of oats	4	4 "	16
7	Depths of ploughing sod for roots	6	4 "	24
8	Depths of ploughing sod for grain	6	5 "	30
9	Rates of seeding nurse crop of barley	4	4 "	16
10	Method of treating neglected land	4	— —	4
11	Depths for underdrainage	21	4 "	21
12	Depths of seeding cereals	4	4 "	16

Outline of Cultural Experiments to be Undertaken.

The new land stumped in 1914 was levelled and brought under cultivation. Two rows of trees on either side of the Johnson property were removed and the stumps taken out.

The farm roads were greatly improved by the use of the junior grader and the split log drag.

A new road was opened from the Experimental Station buildings direct to the Malpeque road, crossing the railway near the division of rotations "D" and "F."

Rotation "F" was given over to the poultry division and fenced with 20-bar poultry fencing, the cedar posts used being dried and the ends placed in the ground treated with creosote.

CHARLOTTETOWN.

EXPERIMENTAL FARM FOR NOVA SCOTIA, NAPPAN, N.S.

REPORT OF THE SUPERINTENDENT, W. W. BAIRD, B.S.A.

WEATHER CONDITIONS.

During the winter of 1914-15 the weather was very unsettled. From the first of January to the end of April, 40 inches of snow and 5·89 inches of rain were recorded, with much thawing and freezing. Spring opened much later than usual, cold, wet weather prevailing until the end of May. During the latter month the average temperature was 4·31° lower than for the same period the previous year. Seeding at this Farm was commenced on June 1. The night temperature was very low, 2° of frost being recorded on the 3rd, hence the soil was rather cold. Notwithstanding these conditions, all grain at this Farm grew satisfactorily. Meadows and most of the new seeding came through the winter in a much better condition than was expected. The latter fared badly on exposed hillside areas, and made little growth until very late. The latter part of June was somewhat unfavourable for growth, as wet, muggy weather prevailed, and while wheat and oats were the least affected, barley suffered considerably, the leaves turning yellow, which greatly retarded growth. July was a very good growing month, but during August the conditions were not so favourable. Roots made only fair growth as thorough cultivation could not be given, due to the rainy weather. Haymaking was also retarded on this account. September was cool throughout, with much fog during the mornings of the first two weeks. All grain ripened too quickly, consequently did not fill properly. October and November were very unsettled, especially the latter, making the satisfactory harvesting of roots very difficult. December for the most part was a typical winter month, though some ploughing was done between the 2nd and 7th, the weather being very mild during that period To sum up, it may be said that the entire growing season was very unsatisfactory for the proper carrying on of farm operations.

SOME Weather Observations taken at Nappan Experimental Farm, 1915.

Month.	Temperature.			Precipitation.			Total Sunshine.
	Highest.	Lowest.	Mean.	Rainfall.	Snowfall.	Total.	
	°	°	°	Inches.	Inches.	Inches.	Hours.
January	53	−10	21·61	2·69	14·00	4·09	75·10
February	54	−14	23·64	1·01	3·00	1·31	94·70
March	48	9	26·35	.....	12·00	1·20	75·00
April	62	18	36·50	2·19	11·00	3·29	100·90
May	71	26	45·72	4·43	.....	4·43	136·15
June	81	30	56·44	3·57	.....	3·57	195·00
July	81	43	62·99	1·95	.....	1·95	215·10
August	81	34	63·04	4·67	.....	4·67	186·60
September	78	32	56·49	1·47	.....	1·47	175·70
October	68	24	48·11	4·11	.....	4·11	145·60
November	57	19	38·46	4·63	.....	4·63	47·90
December	52	6	28·59	3·96	8·00	4·76	64·40
Total for year				34·68	48·00	39·48	151·215
Average for five years				30·79	54·34	36·73	188·457
Total for six growing months, April to September				18·28	11·00	19·38	100·945
Average for 5 years for 6 growing months, April to September				17·74	8·50	18·58	122·834

FIELD CROP YIELDS.

The yields of the crops grown in field lots and under field conditions averaged as follows in 1915:—

Area.	Crop.	Yield per acre.			
Acres.		Tons.	Lb.	Bush.	Lb.
34	Upland hay	3	—	—	—
50	Marshland hay	2	—	—	—
5	Turnips	9	975	316	15
5	Corn	19	912	—	—
2¾	Wheat	—	—	17	00
9¼	Oats	—	—	37	31
1½	Barley	—	—	30	00
1¼	Mixed grain	—	—	28	00
1	Potatoes	—	—	298	5

COST OF PRODUCTION.

The following table gives the approximate cost of production of the various field crops:—

Crop.	Yield per acre.				Cost to produce		
					Per acre.	Per ton.	Per bush.
	Tons.	Lb.	Bush.	Lb.	$ c.	$ c.	Cents
Turnips	9	975	316	15	37 80	3 97	11·9
Ensilage corn	10	912	—	—	41 50	3 96	—
Potatoes	—	—	298	5	53 34	—	17·9
Oats	—	—	37	31	12 09	—	32
Wheat	—	—	17	00	9 65	—	56·7
Barley	—	—	30	00	12 21	—	40·7
Hay	3	223	—	—	13 26	4 35	—

NOTE.—In comparing the cost of production and yields with those of previous years it is found that for the past year the cost is much higher, due largely to the unfavourable weather conditions, for cropping especially.

ROTATION OF CROPS.

The rotation work this year was similar to that of the three previous seasons, details of which are given in the following outline. Careful notes were taken of time required for the different operations on each rotation, in order that as accurate data as possible of the cost incurred in producing the various crops might be obtained. These items will be found in detail in the table which follows.

There is perhaps no other practice followed on the progressive farm that justifies itself more than does a well-thought-out rotation, one that is most suitable to the particular needs of the locality or district in which that farm may be located.

Only three of the many possible rotations are in operation at this Farm, these three being considered the ones most suitable to the general conditions of Nova Scotia. A slight modification of any of them can easily be made to conform with local conditions; but the main object should be to adopt some form of rotation. Where there is sufficient permanent pasturage a rotation such as "B" or "D" will be most suitable, but where a large herd is kept and very little pasturage outside the rotation is available, a four-year rotation, such as "C" should prove satisfactory.

The following is a description of the three rotations in operation here:—

ROTATION "B" (FIVE YEARS' DURATION).

First year.—Roots or corn, manured at the rate of 25 tons per acre.

Second year.—Grain, seeded down with 10 pounds red clover, 2 pounds alsike, and 6 pounds timothy per acre.

Third year.—Clover hay, after which aftermath of clover is ploughed under in the autumn.

Fourth year.—Grain, seeded down with 10 pounds red clover, 2 pounds alsike, and 6 pounds timothy per acre.

Fifth year.—Clover hay, ploughed in the autumn.

ROTATION "C" (FOUR YEARS' DURATION).

First year.—Roots or corn, manured at the rate of 20 tons per acre.

Second year.—Grain, seeded down with 10 pounds red clover, 2 pounds alsike and 6 pounds timothy per acre.

Third year.—Clover hay.

Fourth year.—Pasture, ploughed in the fall for roots.

ROTATION "D" (THREE YEARS' DURATION).

First year.—Roots or corn, manured at the rate of 15 tons per acre.

Second year.—Grain, seeded down with 10 pounds red clover, 2 pounds alsike and 6 pounds timothy per acre.

Third year.—Clover hay, aftermath ploughed under in the autumn for roots or corn.

In order that comparative results may be obtained from year to year in estimating the cost, etc., of the various operations conducted in these rotations, it was deemed necessary to establish fixed valuations from which calculations could be made. Accordingly, these values are used during the different years, regardless of fluctuations in the rate of wages and value of products. Those constant values, more-

over, permit of a much fairer comparison of the different rotations and of the periods of years within a single rotation. These values, including cost and return, are given herewith:—

COST VALUES.

Manual labour	per hour.	$0 17
Horse labour, including teamster—		
Single horse	"	27
2-horse team	"	34
3-horse team	"	41
4-horse team	"	48
Additional horses, each	"	07
Rent	per acre.	3 00
Machinery (inclusive of threshing machinery)	"	60
Barnyard manure (spread)	per ton.	1 00
Commercial fertilizers charged at cost.		
Seed wheat, oats, barley, buckwheat and rye	per acre.	1 00
Seed peas	"	2 00
Turnip, mangel, potato and corn seed charged at cost.		
Grass and clover seed charged at cost, total cost to be distributed over number of years in hay and pasture.		
Twine charged at cost.		
Threshing charged according to actual labour expended, the items chargeable under this head to include only such operations as begin after the load of grain arrives at the feed table, or after the grain is stacked or placed in the mow ready to be thrown on the feed table. Loading, hauling, etc., to be charged to manual and horse labour.		

RETURN VALUES.

Wheat, oats, barley, rye and buckwheat	per pound.	$0 01
Peas	"	01½
Hay (timothy, clover, alfalfa or mixed)	per ton.	7 00
Straw (wheat, oats, barley, rye, buckwheat, or peas	"	4 00
Corn ensilage	"	2 00
Sugar beets	"	3 00
Forage crops (green)	"	2 00
Turnips, carrots, mangels	"	2 00
Potatoes	per bush.	50
Pasture—		
Horses, per head	per month.	1 00
Cattle, per head	"	1 00
Sheep, per head	"	25

The items for which there are no fixed charges have been valued as follows:—

Twine	per pound.	$0 15
Grass seed	"	10½
Clover	"	25
Turnips	"	25
Mangels	"	25
Corn	"	04
Potatoes	per bush.	50

The accompanying detailed table of the results for rotations "B," "C," and "D"

ROTATION "B"

Rotation year.	Crops.		Area.	Items of Expense								
				Rent and manure.	Seed, twine and use of machinery.	Manual labour.		Horse labour (including teamster). Hours.				
						Hours.	Cost.	Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
	1914.	1915.	Ac.	$ c.	$ c.	No.	$ c.	No.	No.	No.	No.	No.
5th	Grain	Hay	8	64 00	29 20	29·2	4 96	3·06	21·16	.....	.....	.....
4th	Clover hay	Grain	8	64 00	21 80	16·0	2 72	.....	104· 0	.....	10	.....
3rd	Grain	Hay	8	64 00	29 20	29·2	4 96	3·06	21·16	.....	.....	.....
2nd	Roots	Grain	8	64 00	21 80	16·0	2 72	.....	104· 0	.....	10	.....
1st	Soiling crop	Roots	8	95 04	10 80	370·0	62 90	148·00	144· 0	.....	20	.....
	Aggregate		40	351 04	112 80	460·4	78 26	154·12	394·32	.....	40	.....
	Average per acre		.....	8 78	2 82	11·5	1 96	3·85	9·86	.....	1	.....

ROTATION "C"

4th	Clover hay	Pasture	5	40 00	7 62	.....	.....	.....	.....	.....	.....	.....
3rd	Grain	Hay	5	40 00	18 25	18·2	3 09	1·9	13·2	.....	.....	.....
2nd	Roots-corn	Grain	5	40 00	13 62	10·0	1 70	.....	66·25	.....	6·25	.....
1st	Pasture	Corn	5	40 00	13 62	600·0	102 00	77·0	73·75	.....	12·50	.....
	Aggregate		20	160 00	53 11	628·2	106 79	78·9	153·20	.....	18·75	.....
	Average per acre		.....	8 00	2 66	31·4	5 34	3·9	7·66	.....	·94	.....

ROTATION "D"

2nd	Roots	Grain	5	40 00	13 62	10·0	1 70	.....	68·25	.....	6·25	.....
1st	Clover hay	Roots	5	40 00	9 30	600·0	102 00	112·5	108·5	.....	12·5	.....
3rd	Grain	Hay	5	40 00	18 25	18·2	3 09	1·9	13·2	.....	.....	.....
	Aggregate		15	120 00	41 17	628·2	106 79	114·4	189·95	.....	18·75	.....
	Average per acre		.....	8 00	2 74	41·88	7 12	7·62	12·66	.....	1·25	.....

has been compiled by using the foregoing cost and return values.

(Five years' duration).

in raising Crop.							Particulars of Crop.						
							Weight.						
Value of horse labour.	Cost of threshing.	Total cost.	Cost for 1 acre.	Cost for 1 bushel.	Cost for 1 ton.	Height of Stubble.	Grain.	Straw.	Hay.	Hoed crop.	Total value.	Value of crop per acre.	Profit or loss per acre.
$ c.	$ c.	$ c.	$ c.	Cts.	$ c.	Inch.	Lb.	Lb.	Lb.	Lb.	$ c.	$ c.	$ c.
8 01	...	106 17	13 27	.....	5 18	.....	.....	.....	40,930	.....	143 26	17 91	4 64
40 16	.....	128 68	16 08	51·5	...	.....	6,627	15,938	.....	.....	98 15	12 27	−3 81
8 01	....	106 17	13 27	.....	4 01	.....	.....	.....	52,910	.....	185 19	23 15	9 88
40 16	.....	128 68	16 08	29·5	...	.....	10,600	25,255	.....	.....	156 51	19 56	3 48
76 92	.....	245 66	30 71	.....	4 87	.....	.....	.....	.....	100,800	100 86	12 60	-18 11
173 26	.....	715 36	...	.....	.....	.....	.....	.....	.....	.....	683 91	.....	.....
4 33	.....	...	17 88	.....	.....	.....	.....	.....	.....	.....	.....	17 10	− 78

(Four years' duration).

.....	.....	47 62	9 52	.....	.....	.....	.....	.....	.....	.....	104 50	20 90	11
4 99	.....	66 33	13 26	.....	4 21	.....	.....	.....	31,545	.....	110 41	22 08	8
25 52	.....	80 84	16 16	48·1	.....	.....	5,337	14,969	.....	.....	83 32	16 66	
51 86	....	207 48	41 50	.....	3 96	.....	.....	.....	.....	104,561	104 56	20 91	−20
82 37	.....	402 27	...	.....	.....	.....	.....	.....	.....	.....	402 79	.....	.....
4 12	.....	.....	20 11	.....	.....	.....	.....	.....	.....	.....	.....	20 14	0 03

(Three years' duration).

26 21	.....	81 53	16 31	24·5	.....	.....	7,179	19,315	.....	.....	110 42	22 08	5 03
73 26	.....	224 56	44 91	9·2	3 07	.....	.....	.....	.....	145,878	145 88	29 18	-15
4 99	.....	66 33	13 26	.....	3 66	.....	.....	.....	36,220	.....	126 77	25 35	12 78
104 46	.....	372 42	.....	.....	.....	.....	.....	.....	.....	.....	383 07	.....	.....
6 96	.....	.....	24 83	.....	.....	.....	.....	.....	.....	.....	.....	25 54	1

HAY CROP.

Some 34 acres of upland was in hay during the past season. This acreage gave a total yield of 102 tons, averaging 3 tons to the acre. The hay, having a large percentage of clover, made an excellent quality of feed for stock, and while unfavourable weather conditions for haymaking were experienced, most of the hay was saved in good condition.

The 50 acres of marsh land also produced an excellent crop, yielding a total of 100 tons, with an average of 2 tons per acre. Generally speaking the hay crop throughout this district was much better in quantity and in quality than in the previous year.

FENCING.

Very little fencing was done at this Farm during the past season. All the back fences, which are through the wooded area, are constructed of poles. These were all repaired during the early part of May. A short section of Page-wire fence was erected just back of the newly stumped field, east of the wood-orchard. Peeled cedar posts, set one rod apart, were used.

CLEARING NEW LAND.

Most of the clearing of new land during the past season was accomplished by alien prisoners. Some 16 acres of heavily stumped land was cleared, and the stumps piled and burned. Three-quarters of this area was in green stumps, hemlock, spruce, and hardwoods, the large percentage being hemlock. Besides the foregoing acreage, 5 acres was chopped out of green forest, part of which had been burned through by forest fire. All the material of any value was manufactured into logs, cordwood and mine props; the remainder being piled and burned, leaving the land ready for stumping. Thirty acres of very rough land was levelled with pick and shovel, this method putting it in better shape for tillage than could be accomplished by two or three ploughings and harrowings. There is still some 10 or 15 acres to be stumped next season. For pulling all large stumps a stumping machine was used.

WATER SYSTEM.

The old water line was inadequate and some of the pipes rusted out, so it was necessary to lay a new line. Some 4,500 feet of 2½-inch galvanized water pipe was laid, at a depth of 5 feet, from the reservoir in the woods to the west end of the horse stable. This system has been in use all winter, giving an adequate supply of water. This work was done by the prisoners, under the supervision of the Superintendent.

ROADS.

The Farm roads and driveways were dragged with the split log drag and harrowed to keep them in good order.

The road machine and split log drag were also put over the main road east and west of the Farm, to encourage an interest in maintaining the public highway, and to demonstrate the work of the split log drag for that purpose. It is an implement that can be operated economically, and its value as a road improver is yet too little appreciated.

NAPPAN.

EXPERIMENTAL STATION FOR ANNAPOLIS AND CORNWALLIS VALLEYS, KENTVILLE, N.S.

REPORT OF THE SUPERINTENDENT, W. SAXBY BLAIR.

As reported last year, owing to lack of land other than devoted to fruit, and other experimental work, no regular system of rotation for field crops has been adopted. However, during the past season 20 acres were cleared which it is proposed to devote to rotation tests as soon as an adjoining area of the same size is available. The greater part of this cleared area will next year be in corn and turnips.

THE SEASON.

The season of 1915 in general was an unsatisfactory one, in that seeding was delayed by much cloudy weather, and more or less continuous light rains, which kept the ground from drying out sufficiently for proper working. The seeding was late except on well-drained areas. The grain came on well, however, except on very wet places, and the average yield was fair. The hay crop was a good one, but, owing to much cloudy weather at harvest time, this operation was much drawn out, and a considerable amount of hay was damaged. The corn crop, although sown late, made good growth, the fall being particularly favourable for maturing this crop. The root crop was unusually light, which seems to be difficult to account for except by the facts that this crop was put in much later than usual, the ground in many cases could not be properly worked, and in many places the crop suffered from excessive moisture. The summer was a favourable one for getting clearing work done; the soil did not get hard and dry as it usually does, which made stumping less difficult, and the rains were such that there was very little lost time. The fall was favourable for ploughing.

Weather Observations taken at Kentville Experimental Station, 1915.

Month.	Temperature F.			Precipitation.				Total Sunshine.
	Highest.	Lowest.	Mean.	Rainfall.	Snowfall.	Total.	Heaviest in 24 hours.	
	°	°	°	Inches.	Inches.	Inches.	Inches.	Hours.
January	56	−4	22·83	2·64	21·0	4·75	0·85	73·4
February	54	−9	25·61	0·63	6·25	1·25	0·4	99·6
March	50	9	26·81	0·0	9·50	0·95	0·5	103·1
April	64	21	39·36	1·15	5·50	1·70	1·1	107·4
May	71	28	46·14	2·24	2·60	2·50	0·87	160·9
June	81	33	56·8	2·43	.....	2·43	0·57	180·3
July	82	46	64·0	1·52	.....	1·52	0·37	215·7
August	81	42	63·8	3·84	.....	3·84	1·67	168·3
September	83	30	57·25	0·85	.....	0·85	0·23	194·0
October	72	28	49·05	3·88	.....	3·88	1·13	171·1
November	61	22	39·15	2·81	.....	2·81	1·01	65·5
December	54	6	29·14	2·34	15·37	3·87	1·14	56·4
Totals for year				24·33	60·22	30·35	.....	1595·7
Average for year				.....	.....	2·53	.....	132·97
Total for 6 growing months, April to September				12·03	8·1	12·84	.....	1026·6
Average for 6 growing months, April to September				.....	.....	2·14	.....	171·1
1914, Total for 6 growing months, April to September				14·62	1·05	15·67	.....	1259·7
1913, Total for 6 growing months, April to September				.....	.....	16·66	.....	1232·5

OATS.

Five acres of Banner oats were sown on land that had been in corn the previous season. Ground limestone was applied at the rate of 2,000 pounds per acre, when the ground was first worked, and, before seeding, 400 pounds of acid phosphate per acre was applied and harrowed in. Nitrate of soda at the rate of 100 pounds per acre was scattered broadcast when the grain was about 2 inches high. The grain was sown at the rate of 2½ bushels per acre with the disc seed drill. A mixture of grass and clover, made up of common red clover 8 pounds, alsike clover 2 pounds, and timothy 12 pounds was sown at the same time. The seeding was done May 18, and the grain cut September 3. The yield was 57⅝ bushels per acre.

Five acres of ground stumped in 1914 was worked and seeded to oats June 11. The yield of oats was 27·4 bushels per acre. Five acres seeded July 2, on a piece of ground newly broken, yielded 17·8 bushels per acre. The total yield of oats was 515 bushels on the 15 acres.

INDIAN CORN.

Three and three-quarters acres of ground, which had been broken up the previous summer and seeded to winter rye in September, was manured at the rate of 15 tons manure per acre ploughed under during the first week in June, and corn planted. The growth of winter rye was not heavy, and was quite uneven, but it made a fair math to plough under. The yield of green fodder was 9 tons 750 pounds per acre.

Three acres which had been broken the previous year was manured at the rate of 20 tons per acre, except half an acre which was left without manure. Each half-acre received a different application of fertilizer. The ground limestone was applied at the rate of 2,000 pounds, acid phosphate 400 pounds, and fish scrap 600 pounds per acre. The corn was sown June 11, and cut October 1.

Fertilizer treatment.	Yield per acre.	
	Tons	Lb.
Manure only	10	1,640
Manure and lime	13	10
Manure, lime and acid phosphate	14	1,250
Manure and acid phosphate	13	1,630
Manure and fish scrap	14	1,350
No manure and not fertilized	4	1,180

Three and one-half acres of field corn, part of which was on newly broken land and part on land that had produced one crop of oats, was manured with 15 tons manure per acre, and fertilized with acid phosphate at the rate of 400 pounds per acre. This yielded 10 tons 960 pounds of green fodder per acre. The total area in field corn, 10½ acres, yielded 108 tons 1,192 pounds, or 10 tons 1,189 pounds per acre of green fodder.

TURNIPS.

Two acres of turnips were grown in field tests on ground that was broken up in 1913 and had been in oats in 1914. The land was rough, with many roots in it, and so uneven that it could not be drilled, consequently the turnips were given level culture. The ground was prepared by spreading 20 tons stable manure per acre, ploughing it

16—1916—26a. Face p. 284.

C. E. F., Ottawa. Double Cutaway disc harrow. An implement capable of materially reducing the cost of preparing the soil for seed after the land is ploughed.

C. E. F., Ottawa. Single disc drill with roller preceding it. Wide implements as represented by this drill are factors that tend to reduce cost of production. The roller, on the average, is of least value used after seeding, the greatest value of this implement lies in its usefulness as a means of preparing the land previous to seeding.

Early Red Fife wheat. Experimental Station, Charlottetown. P. E. I.

A field of O.A.C. 72 oats, Experimental Station, Charlottetown. P. E. I.

Cutting Corn for Silage, Cap Rouge, Que.

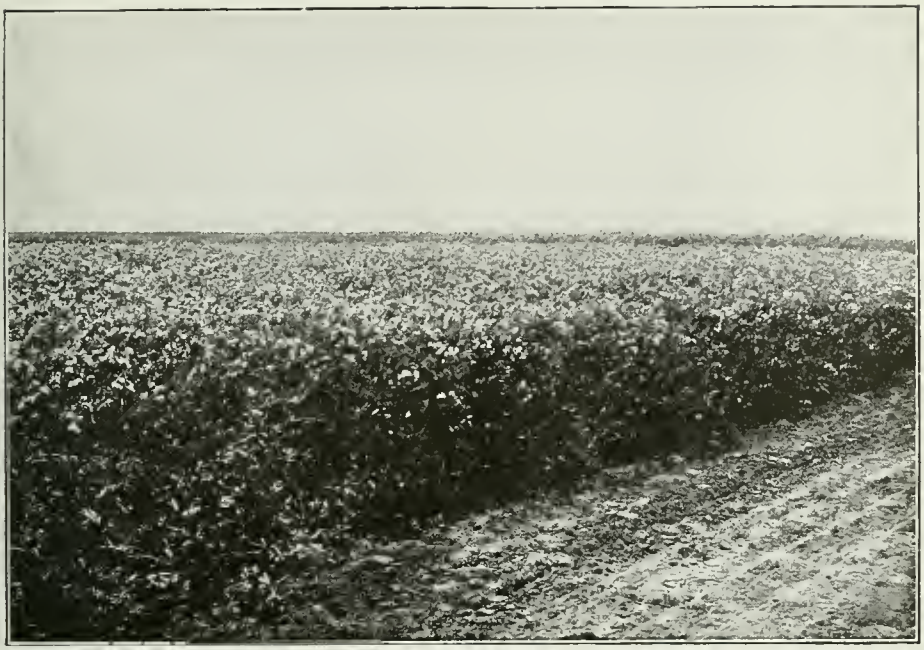
Victory Oats, yield 112 bushels per acre, Indian Head, Sask.

Brandon, Man. Threshing scene: the little separator is threshing experimental plots and the larger one rotation fields.

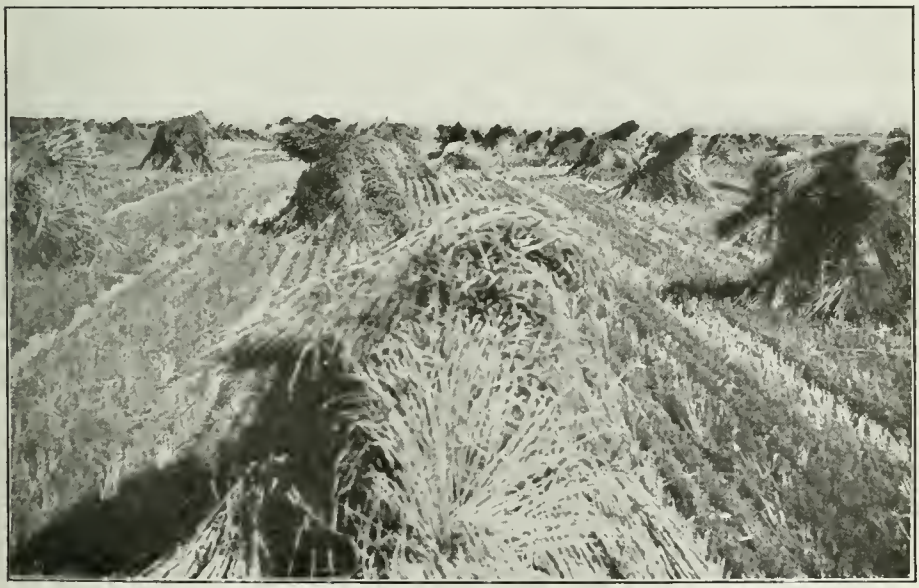
Silo filling, Brandon, Man.

Fodder Corn, Lethbridge, Alta.

Fodder Corn after cutting, Lethbridge, Alta.



Scott, Sask. Arthur peas, barley following peas in the back ground.



Marquis wheat on Rotation 'O' yield 70 busnels 33 pounds to the acre, 1915, Lacombe, Alta.

Agassiz, B. C. Spring Tooth Cultivator. Most useful on land infested with "Couch" and "Canada Blue Grass".

Agassiz, B. C. Double Cutaway Disc Harrow. Supreme for preparing land for corn and roots or on all sod work.

under and levelling, after which fertilizer was applied to different half-acre plots as indicated below. The seed was sown May 17 and 18, and the crop harvested October 18 and 19. The land on which these were grown was very damp when worked, and was not thoroughly prepared, which facts no doubt account somewhat for the small yield. The ground limestone was used at the rate of 1,500 pounds, slag at 500 pounds, and acid phosphate at 400 pounds per acre.

Fertilizer treatment.	Yield per acre.	
	Bush.	Lb.
Manure with lime and acid phosphate	615	38
Manure with acid phosphate	608	40
Manure with slag	600	25
Manure and no fertilizer	527	00

An area of 2 acres was planted to turnips for the third year in succession. The object in view in running this area in turnips for three years was to determine whether club-root would appear and, if it did, to work out methods of control. A slight amount of club-root was noticed in 1914, and during the present year it was more or less distributed over the upper part of the area. Part of this area will be treated with lime for club-root in 1916 and followed with turnips again to find out whether the disease has been eradicated. The ground was manured at the rate of 10 tons per acre, and fertilized with 400 pounds of acid phosphate per acre. The yield of turnips from this field was 544 bushels per acre. One acre which had recently been stumped was also manured with 20 tons manure per acre and seeded to turnips, giving a yield of 780 bushels. The total yield of turnips from the field areas was 3,042 bushels.

HAY.

The seventeen acres of newly broken land which was in oats last season produced a poor crop of hay this year. The clover on this area was very uneven. The area, fertilized for oats in 1914, gave a yield of 1 ton 986 pounds per acre, and the area not fertilized for oats in 1914, 1 ton 266 pounds per acre, a total of 21 tons 122 pounds. The above land was broken in 1913 and, when seeded to oats in 1914, 5 acres was fertilized with a fertilizer containing 4 per cent nitrogen, 8 per cent phosphoric acid, and 5 per cent potash, at the rate of 400 pounds per acre, and the balance of the area of 12 acres was not fertilized. The yield of oats on the fertilized area was 53·2 bushels per acre, and that on the unfertilized, 40·6 bushels per acre.

The 8 acres of marsh yielded 11 tons 780 pounds hay. Additional areas yielded 3 tons 680 pounds, or a total hay crop of 35 tons 1,582 pounds.

FENCING.

A fence was put across the upper part of the ravine to inclose the young stock pasturing there. The fence was made of plain wire and cedar posts set a rod apart. One thousand seven hundred feet were put up over an extremely uneven piece of ground.

UNDERDRAINING.

Seven acres of dyked marsh were underdrained in August, the drains being put 30 feet apart and ranging from 2 to 3½ feet deep. The tile laid amounted to 10,160 feet. The cost of tile was $194.84, the cost of digging, laying and filling, $329; total cost, $523.84; cost per acre, $74.69. The 3-inch tile cost $19 and the 4-inch $25 per thousand, delivered. The 4-inch tile were laid in part of the two main drains only. The digging, laying, and filling cost 53 cents, and the tile 31 cents per rod. This area has been ploughed for seeding next spring.

PASTURAGE.

The pasture land connected with the Station is extremely limited. An area of 3 acres at the north end of the ravine adjoining the main road, made up largely by tidal deposit, has been used for a cow pasture, the cattle being allowed this range at night, and kept in the stable during the day. The young cattle were given the range of the ravine. The ravine, however, is heavily wooded, except along the lower part, and does not give very extensive pasturage, probably not more than 5 acres of relatively poor grazing land.

AREA CLEARED.

The Station property, when purchased, was largely in second-growth woods, composed principally of spruce, hemlock, pine, poplar, birch, beech, and maple. This growth was cut and the work of clearing started. Much of the growth was in the nature of root sprouts, and was of little value for wood. A striking characteristic of this land is the vigorous sprout growth from the stumps and roots of the deciduous trees. There is apparently no way of killing the roots except to blast and pull them by machine work. The land is such that the roots, for the most part, run deep into the soil, thus increasing the difficulty of clearing.

An effort was made to kill out the stumps on one area by cutting the sprout growth during the middle of the summer and burning it off the following June. On going over the area after the fire, it was thought no growth could possibly start from the stumps left, but by the following June a thick growth had sprung up, and this area, which it is proposed to stump next year, will have to be gone over with the brush scythe in order to get at the stumps. It would appear almost impossible to kill out the stumps of any of the trees, except the evergreens, which necessarily means that most of the stumping work is done on green stumps which are exceedingly difficult to move.

After the stumps are lifted it is necessary to clear the roots of the large mass of earth surrounding them in order to get them dry for burning. The roots are also exceedingly difficult to work into compact piles to burn and in many cases have to be cut up to pile. After the stumps are burned it is necessary to use three pair of oxen on a Manitoba brush breaker plough to break the land, owing to the network of tough roots still remaining in the soil. After the first ploughing the small stumps and roots are thrown together into small piles and burned. The ground is then harrowed with a common spring-tooth harrow which levels the land sufficiently for a wagon to go over the land and remove the many stones and boulders. This land is allowed to lie for a month or so and is then again cross ploughed, roots and stones are again gathered, after which it is ready for corn or grain the following year.

The area cleared in this way amounts to 112 acres. There are about 25 acres still available for breaking at the rear of the farm, and when this is done most of the area that can be used for crops will have been cleared, as the balance of the wooded

area is rough and unfit for agricultural purposes. The roads, end ridges, and places not available for cropping amount to about 10 acres, leaving 102 acres of land for crops. The farm area comprises 301 acres, which may be classified as follows:—

	Acres.
New land broken to the end of 1912	55
" " in the year 1913	17
" " " 1914	20
" " " 1915	20
Total new land broken	112
Land still available for clearing	25
Front area devoted to buildings and grounds	18
Area devoted to poultry	2
Area for picnic grounds, etc	2
Dyked area	9
Marsh pasture area	3
Ravine pasture	5
Area in ravine which is too rough for clearing	125
Total	301

The total expenses connected with the clearing of 20 acres during the past year amounted to $5,114.06 or $255.70 per acre.

EXPERIMENTAL STATION FOR NEW BRUNSWICK, FREDERICTON, N.B.

REPORT OF THE SUPERINTENDENT, W. W. HUBBARD.

WEATHER CONDITIONS, 1915.

December, 1914, was remarkable for an unusual amount of sunshine and lack of precipitation. The last week of the month was very cold. As there was no snow on the ground the frost penetrated farther than for some years. January, February, and March were unusually mild, with but little precipitation. The snow-covering was at no time deeper than 6 inches, and much of the time the fields were practically bare. After the 9th of March there was no snow-covering, and warm days with freezing nights made most unfavourable conditions for grasses and clovers. April was wet, with only 102 hours of bright sunshine. May had sixteen rainy days with continuous cool temperature, but no frost. June followed with twenty wet days and no really warm weather. There was no period during either May or June when any but thoroughly drained land could be properly cultivated, so that much sowing and planting was badly done. July had only fourteen rainy days, but in one 24-hour period there was a rainfall of 3·26 inches. August had thirteen wet days and up to September 1 the nights were cold, with continuous abnormally low temperature. From May 1 till September 1 there was a rainfall of 19 inches, while the average rainfall for the last forty-two years for these four months has been 14·6 inches. September, October, and November were, however, fine and warm, compensating somewhat for the earlier unfavourable conditions, and affording the best of harvest weather.

While in many sections there was much low-lying land that could not be cropped, on land that was seeded the yields were better than might have been expected. No spring frosts were recorded after the 1st of May. The first autumn frost occurred on the 26th of September, but was only felt in low-lying areas. Potatoes, corn, squash, tomatoes, etc., were damaged by frost on the 2nd of October, but were not completely killed until the 11th of that month.

Some Weather observations taken at the Experimental Station, Fredericton, 1915.

Month.	Temperature F.			Precipitation.	Total Sunshine.
	Highest.	Lowest.	Mean.		
1915.	°	°	°	Inches.	Hours.
January	50·5	−28·0	18·83	2·71	85·8
February	46·5	−20·5	21·75	2·47	107·9
March	47·5	6·5	27·9	0·62	121·35
April	63·0	21·0	40·6	3·175	102·75
May	75·0	30·0	47·4	4·995	180·8
June	84·0	32·0	60·4	4·98	174·85
July	85·0	40·0	66·3	4·87	227·05
August	85·0	36·5	64·1	4·12	161·34
September	82·5	32·0	56·6	2·75	158·0
October	74·0	26·0	47·0	2·38	147·3
November	57·0	17·0	35·4	2·66	76·3
December	47·0	3·0	24·6	4·495	61·65
Total for year				40·225	1605·09
Average for 41 years				43·8	1996·0
Total for 6 growing months, April to September, 1915				24·89	1004·79
Total for 6 growing months, April to September, 1914				19·08	1304·2
Total for 6 growing months, April to September, 1913				16·9	1247·0

The following are dates of field operations:—

First seeding of field grain	May 7
First planting of potatoes	May 12
Last seeding of oats	June 3
Last planting of potatoes	July 6
First planting of corn	June 12
Hay harvesting commenced	July 20
Grain harvesting commenced	Aug. 23
Corn cutting commenced	Sept. 28
Date of freezing up	Dec. 4

CROP YIELDS.

OATS.

Twenty-four and three-fifths acres of oats were sown. The following statement gives the particulars:—

Field.	Variety.	Date of seeding.	Amount of seed.	Area.	Yield.
			Bush.	Acres	Bush.
1	Banner	May 21	6½	2½	105
2	Banner	May 21–24	10	3½	113
3	Banner P. E. Island	May 31	17	5½	105
4	Ligowo	June 2–3	18½	5½	117
5	New Market	June 3	17	5¾	62
6	Early Blossom	June 3	7	2	42
7	Ottawa Banner	June 4	2	⅔	32
	Mixed grain in cleaning up machine and floors while threshing above				18
			78	24⅗	594

The average yield per acre for the total crop was 24·1 bushels.

Field 1 covered an area in the orchard under fertilizer experiment, some plots were well fertilized under last year's potato crop, others were not fertilized at all, and some plots received incomplete fertilizer.

Field 2 was newly broken rough land without fertilizer of any kind, the seed sown broadcast and covered with the drag harrow.

Fields 3, 4, 5 and 6 were also all new rough land, very uneven, and parts of them very wet. The ground was full of roots and with many boulders, which prevented getting the crop off part of the area. The wet season also kept many of the low spots full of water, drowning out about 30 per cent of the crop.

Field 7 was fertilized last year for corn. It was rather wet and could not be seeded earlier.

BUCKWHEAT.

Five acres of buckwheat were sown, all on new, rough, and very wet land; consequently, the yield was very small. Two bushels of Rough buckwheat, two bushels of Smooth (Silver Hull) and two bushels of Barley or Rye buckwheat were sown, and the return was 51 bushels. On account of the condition of the land, seeding was not accomplished till the 5th of July.

PEAS.

One bushel of Golden Vine peas, inoculated with nitro culture, was sown on one-third of an acre on the 8th of June. The same quantity, not inoculated, was sown on an equal area on the same date. No difference between the two plots could be discerned at any time, and the crop did not become ripe enough to thresh properly. It was also impossible to dry the threshed grain or to compute the yield.

Arthur peas were sown on three-fifths of an acre on the 3rd of June, and ripened fairly well. The yield was 18 bushels.

TURNIPS.

Eleven and three-quarter acres were devoted to swede and white turnips. Part of the swedes were sown on the 5th, 7th, 8th, and 9th of June; part on the 14th of June,

and the remainder on the 28th, 29th, and 30th of June and the 1st and 2nd of July. The white turnips were sown on the 15th, 20th, and 22nd of July. Much of the land was very wet, part of it having been cleared last year, and being under crop for the first time.

The swede turnips averaged 891 bushels (22 tons 550 pounds) per acre; the white (Ewings Improved Mammoth Purple Top) averaged 917 bushels (22 tons 1,850 pounds). Some of these white turnips were in perfect preservation on the 31st of March, 1916.

The new land was manured at the rate of 16 tons of barnyard manure per acre, and either bone meal or basic slag was applied at the rate of 400 pounds per acre. There was no difference in the appearance of the turnips. The crop was inadvertently mixed in the hauling, and no comparison in relative yield was obtainable. These turnips were called "Greystone," but seemed more like "Swede." Sown on the 1st and 2nd of July, they yielded, when pulled on the 3rd and 4th of November, at the rate of 798 bushels per acre.

Four acres of land that was in corn in 1914, manured at the rate of 16 tons to the acre for the corn crop, was this season sown to turnips, after it had received 500 pounds basic slag per acre broadcasted and 400 pounds of fertilizer in the drill. The fertilizer was made up of 50 pounds nitrate of soda, 50 pounds of sulphate of ammonia, 250 pounds of acid phosphate, and 50 pounds of muriate of potash. Twelve rows, covering an area of 0·287 of an acre, received no fertilizer, twelve rows of equal area received basic slag at the rate of 500 pounds per acre, and the balance of the field received the fertilizer above described. The portion without fertilizer yielded at the rate of 523 bushels per acre, that with basic slag at the rate of 698·7 bushels per acre, and the balance of the field with the full fertilizer allowance, at the rate of 876 bushels per acre. The yield on this latter part of the field was reduced by the occurrence of club root in several well-defined areas.

A plot of an acre and a quarter was sown to Invicta swede turnips. This land was newly underdrained and had 16 tons of barnyard manure per acre applied in 1914 for a corn crop. It received 16 tons again in the spring of 1915, which was ploughed in. Acid phosphate at the rate of 480 pounds per acre was applied in the drill. The yield was 921 bushels per acre.

Nineteen varieties of swede turnips were tested on plots of one-twentieth of an acre each on land that had, in 1913, 16 tons manure per acre for corn, and in 1914 an equal quantity for turnips, and again 8 tons for plot work in 1915. The yield varied from 860 bushels per acre in the case of Bangholm, to 1,228 bushels in the case of Empress, with an average yield for the nineteen varieties of 1,110 bushels per acre. These plots were all sown on the 1st and 3rd of June and harvested on the 29th of October.

Mangels, sugar beets, and carrots were grown, in plots only, for test of varieties, on land treated the same as for turnip plots.

CORN.

Eleven and six-tenth acres of land were seeded to Wisconsin No. 7 and White Cap Yellow Dent corn for ensilage purposes, and nine-tenths of an acre was devoted to the testing of eighteen varieties of corn, the product of this area also being put in the silo. Nine and six-tenth acres were planted on newly cleared land, this being the first crop. This land was spring ploughed and levelled as well as possible; sixteen loads of barnyard manure to the acre were applied, and an attempt was made to work this manure into the soil with disc and cutaway harrows, but as the manure was somewhat strawy the land had again to be ploughed to enable the corn planter to work. The seed was sown at the rate of 1 bushel per acre, but the land was so full of small roots that the planter had to be followed with hand hoes to ensure all the seed being covered. Basic slag was applied broadcast at the rate of 400 pounds per acre, and portions of the field

were fertilized at the rate of 50 pounds nitrate of soda, 50 pounds sulphate of ammonia, and 50 pounds muriate of potash per acre. This material had to be mixed with dry sand to enable the planter to sow it. The result of this application was that Wisconsin No. 7, where fertilizer was added, yielded 6 tons 289 pounds per acre; without fertilizer, 7 tons 351 pounds. White Cap Yellow Dent with fertilizer, 5 tons 1,855 pounds per acre, and without fertilizer 5 tons 1,347 pounds per acre. It is only fair to add that the crop was so uneven and so retarded by cold wet weather that only about half a normal yield was obtained in either case.

On the 2 acres planted on land for many years under cultivation and manured the two previous years with 16 tons of barnyard manure per acre, there was again made this year an application of 16 tons of manure per acre. One acre received, in addition, 50 pounds nitrate of soda, 50 pounds sulphate of ammonia, 250 pounds acid phosphate, and 50 pounds muriate of potash. The acre on which the fertilizer was applied made much the stronger start and up to the 15th of August looked as if it would give double the crop when compared to that where no fertilizer was applied, but during September the difference between the crops was much reduced. The acre where fertilizer was applied yielded 8 tons 480 pounds and the acre where no fertilizer was applied yielded 7 tons 1,260 pounds. The variety test plots receiving an application of 16 tons of barnyard manure alone, yielded at an average rate of 11 tons 133 pounds per acre.

POTATOES.

Seven acres of potatoes were grown, with the exception of 1 acre, under either fertilizer or variety tests. This 1 acre, planted commercially to get figures as to cost of production, was manured at the rate of 16 tons barnyard manure and 400 pounds per acre of an approximately 4-9-6 mixture, the materials being 50 pounds sulphate of ammonia, 50 pounds nitrate of soda, 250 pounds acid phosphate, and 50 pounds potash.

This was the first crop on newly cleared land, and the yield was 80 barrels (220 bushels), which sold out of the field for $1.75 per barrel for table stock, and 7 barrels (19·25 bushels) which sold for 50 cents per barrel for poultry feed. The sale value of the crop was thus $143.50, and after deducting cost of production ($66.93) left a net profit of $76.57. The varieties were Irish Cobbler, Green Mountain, and Empire State planted on the 19th of June. The yield was cut down somewhat by diseases known as Rhizoctonia and Mosaic. The crop was harvested on the 15th of October.

The cost of production was made up as follows:—

Seed, 21 bushels at 60 cents per bushel	$12 60
Cutting seed at 10 cents per bushel	2 10
Ploughing land twice at 32 cents per hour	3 20
Harrowing twice	64
Harrowing in manure with disc harrow	1 28
Manure, 16 tons at $1	16 00
Applying manure with spreader	2 72
Fertilizer, 400 pounds applied in row when planting	6 37
Planting, man, boy and team, 3 hours	1 41
Cultivating 5 times, 7½ hours at 25 cents	1 87
Horse hoeing (hilling), 3 times, 4½ hours at 32 cents	1 44
Hand hoeing (partially), 15 hours at 18 cents	2 70
Weeding (partially), 2 hours at 18 cents	36
Spraying six times at $1.25	7 50
Digging, man and team, 4 hours	1 28
Picking potatoes, 5 men, 5 hours each at 18 cents	4 50
Delivering from field, man and team, 3 hours	96
Total cost per acre	$66 93

FREDERICTON.

HAY.

There was no newly seeded meadow, but hay was cut on between 55 and 60 acres of land. Some of this area had been in sod for many years and some was newly cleared land, off which one crop of oats had been taken and which is yet in a rough and undrained condition. The crop harvested was 60 tons.

CLEARING LAND.

Approximately 40 acres of land were stumped and ploughed, and bushes were cut and burned off 35 acres more. One man was kept almost steadily burning bushes, stumps, and roots. The standing wood was sold on 20 acres, and all growth was cut clean and the brush left in windrows. The process of clearing was the same as reported in 1914. Stumping powder was used on all stumps that would not yield readily to the draught of a two-horse team without blocks and tackle. More or less chopping of solid roots was done with the axe, and pieces of stump taken out in such form as to be handled by two men. The total amount spent on land clearing operations was $3,043.38, of which $523.01 was for explosives and the balance for labour.

A large number of boulders and stones were removed from the land, some being piled in the field for removal during the winter. A good deal of work was done in blowing out and breaking of boulders with dynamite.

FENCING.

Six hundred and thirteen rods of woven wire fence was erected, with cedar posts set one rod apart. One hundred and three posts were creosoted by immersion for two hours in hot crude oil. Seventy-three rods of woven wire temporary fence was erected, with cedar stakes driven by a heavy mallet, to fence off crop from pasture, and 31 rods of three-strand barbed wire for a like purpose.

DRAINAGE.

Approximately 30 acres were underdrained with tile. Most of the ditches were 30 feet apart, some were 40 feet. Twenty-three thousand cement and clay tile were laid. Pole drains, covered with brush to a depth of 18 inches, were laid to a length of 1,905 feet on account of the scarcity of tile. A drain was dug in the middle of the new entrance road, a stone pipe 6 inches square laid in the bottom and the ditch filled to the surface with stone; over this, broken stone was spread 1 foot in depth and to a width of 12 feet. This road will later be macadamized.

Open drains of varying depths to the extent of 5,626 feet were dug to provide outlets from underdrains and to carry off surface flow. Some of these next season will be widened with the ditching plough or the scraper. On 20 acres of newly cleared land not yet underdrained, the land was ploughed into ridges 30 feet across and the dead furrows were deepened and the sides sloped off by the ditching plough, using four horses. Clearance for the surface flow was made from these dead furrows by the ditching plough, where necessary.

FREDERICTON.

EXPERIMENTAL STATION FOR EASTERN QUEBEC, STE. ANNE DE LA POCATIERE, QUE.

REPORT OF THE SUPERINTENDENT, JOSEPH BEGIN.

WEATHER CONDITIONS AND CROP NOTES, 1915.

There was much more rain than snow during the winter 1914-15. The ground therefore remained unprotected from the frost and clover meadows were practically destroyed by ice during the winter. The spring was late, wet and cold making it impossible to work the soil during the first half of May. Thus, seeding started two weeks later than usual and was continued under adverse conditions, on account of the frequent rains which occurred during the latter part of May and the first two weeks of June.

Fodder corn was sown between the 8th and 12th of June, the soil being still very cool, even at that late date. Grain germinated slowly on account of the lack of heat. Hay and pasture suffered greatly from the lack of rain towards the end of June and during the early part of July, with the result that the yield of hay was low. There was a little rain towards the end of July, which enabled fodder corn and grain to recover and give a very satisfactory crop. There was a great deal of rain in September and the harvesting operations were conducted with difficulty. However, roots and even corn grew well during September, the former yielding 23 tons per acre. The month of October was favourable for the ploughing of sod, as the land had been well prepared by the rain of September.

SOME Weather Observations taken at Ste. Anne de la Pocatière Experimental Station, 1915.

Month.	Temperature F.			Precipitation.			Total Sunshine.
	Maximum.	Minimum.	Mean.	Rainfall.	Snowfall.	Total.	
	°	°	°	Inches.	Inches.	Inches.	Hours.
January	47·0	—18·4	16·2	·92	7	1·62	73·3
February	35·2	—16·4	17·7	2·38	13	3·68	81·8
March	43·6	— 0·6	22·6	·10	7	·80	140·8
April	59·2	15·0	39·4	2·07	.....	2·07	181·4
May	69·0	29·4	48·6	3·86	1	3·96	199·2
June	83·4	32·4	57·9	2·30	.....	2·30	266·8
July	86·4	43·2	64·4	1·81	.....	1·81	254·2
August	85·2	44·6	61·6	3·05	.....	3·05	195·3
September	84·4	34·2	55·6	3·85	.....	3·85	184·5
October	67·0	26·4	46·0	2·20	.....	2·20	122·3
November	47·0	17·2	32·2	1·07	6	1·67	95·2
December	34·2	—10·4	20·9	·40	15	1·90	65·8
Total for year					49	28·91	1,860·6
Total for six months, May to October						17·17	1,222·3
Total for six months, November to April						11·74	638·3

CROP YIELDS.

The following table shows the yields of crops at the Station in 1915. With the exception of hay, which was very poor, the crops compare favourably with the average for the past three years.

Crop Yields on Rotations.

Crop.	Area.	Total Yield.		Average yield per acre.	
	Acres.	Tons Lb.	Bush. Lb.	Tons Lb.	Bush. Lb.
Wheat	1	.....	79 00	.....	39 30
Barley	2	.....	68 00	.....	34 00
Oats	3	.....	228 00	.....	76 00
Peas	1	.....	33 00	.....	33 00
Roots	2	44 400	1473 20	22 200	736 40
Corn	10	110 000	.....	11 00	.....
Potatoes	1	.....	301 00	.....	301 00
Hay	17	21 500	.....	1 500	.....

COST OF PRODUCTION OF FIELD CROPS, 1915.

The following itemized statement is made, herewith, of the cost of production of oats, roots, fodder corn, and hay. The spring being unfavourable for seeding operations and for crops, the cost was considerably higher than in former years. The high cost for oats and hay especially was due largely to this condition.

COST OF PRODUCTION OF OATS.

Three acres of oats were grown in a four-year rotation of corn, oats, hay, hay. The corn field was shallow ploughed in the fall in part preparation for the oats. With the oats was sown a seeding mixture of timothy and clover.

Number of acres, 3.

Rent of land, $3 per acre	$ 9 00
Use of machinery at 60 cents per acre	1 80
One-fourth share of manure, 20 tons per acre, $1 per ton	15 00
Ploughing in autumn, 28 hours, 2 horses at 34 cents	9 52
Discing, 25 hours, 2 horses at 34 cents	8 50
Harrowing, 4 hours, 2 horses at 34 cents	1 36
Sowing, 8 hours, 2 horses at 34 cents	2 72
Rolling, 4 hours, 2 horses at 34 cents	1 36
Twine, 10 pounds at 12 cents	1 20
Cutting, 8 hours, 2 horses at 34 cents	2 72
Stooking, manual labour, 16 hours at 17 cents	2 72
Hauling, 8 hours, 2 horses at 34 cents	2 72
Loading, manual labour, 10 hours at 17 cents	1 70
Threshing, 228 bushels at 2½ cents	5 70
Total cost for 3 acres of oats	$66 02
Cost per acre	22 01
Yield of oats per acre ..bushels.	76
Cost of production per bushel (straw excluded) ..cents.	28·96

STE. ANNE DE LA POCATIERE.

COST OF PRODUCTION OF ROOTS.

Number of acres, 2.	
Rent of land, $3 per acre	$ 6 00
Use of machinery, 60 cents per acre	1 20
One-third share of manure, 15 tons per acre at $1	10 00
Ploughing, 18 hours, 2 horses at 34 cents	6 12
Rolling in autumn, 4 hours, 2 horses at 34 cents	1 36
Discing in autumn, 6 hours, 2 horses at 34 cents	2 04
Discing in spring, 10 hours, 2 horses at 34 cents	3 40
Harrowing, 4 hours, 2 horses at 34 cents	1 36
Ridging, 6 hours, 2 horses at 34 cents	2 04
Seed, 16 pounds at 25 cents	4 00
Seeding, manual labour, 20 hours at 17 cents	3 40
Cultivating, 5 hours, 1 horse at 27 cents	1 35
Singling, manual labour, 100 hours at 17 cents	17 00
Cultivating, 5 hours, 1 horse at 27 cents	1 35
Pulling, topping, manual labour, 100 hours at 17 cents	17 00
Hauling, 2 horses, 15 hours at 34 cents	5 10
Total cost for 2 acres	$82 72
Cost per acre	41 36
Yield per acre ..bushels.	736·7
Cost per bushel ..cents.	5·61
Cost per ton	$1 86

COST OF PRODUCTION OF FODDER CORN.

Number of acres, 10.	
Rent of land, $3 per acre	$ 30 00
Use of machinery, 60 cents per acre	6 00
One-fourth share of manure, 20 tons at $1 per ton	50 00
Ploughing, 105 hours, 2 horses at 34 cents	35 70
Discing, 115 hours, 2 horses at 34 cents	39 10
Seed, 4 bushels at $2	8 00
Sowing, manual labour, 190 hours at 17 cents	32 30
Rolling, 5 hours, 2 horses at 34 cents	1 70
Harrowing, 25 hours, 1 horse at 27 cents	6 75
Cultivating, 25 hours, 1 horse at 27 cents	6 75
Hoeing, manual labour, 104 hours at 17 cents	17 68
Cultivating, 20 hours, 1 horse at 27 cents	5 40
Cutting, manual labour, 90 hours at 17 cents	15 30
Hauling, 45 hours, 2 horses at 34 cents	15 30
Filling silo, manual labour, 105 hours at 17 cents	17 85
Mechanician, 28 hours at 17 cents	4 76
Total cost for 10 acres	$292 59
Cost per acre	29 26
Yield per acre ..tons.	11
Cost per ton	$2 66

COST OF PRODUCTION OF HAY.

Three acres of hay were grown in a four-year rotation including corn, oats, hay, hay, and the figures given are for the first crop of hay of the rotation, from a seeding of 10 pounds red clover, 2 pounds alsike, and 12 pounds timothy per acre. The cost is representative of the average of the three rotations. It is high owing to the fact that the crop was greatly reduced by the severe winter and the lack of timely rains.

Number of acres, 3.	
Rent of land, $3 per acre	$ 9 00
Use of machinery at 60 cents per acre	1 80
One-fourth share of manure, 20 tons per acre, $1 per ton	15 00
Half cost of timothy and clover	7 89
Cutting 6 hours, 2 horses at 34 cents	2 04
Raking, 4 hours, 1 horse at 27 cents	1 08
Tedding, 4 hours, 2 horses at 34 cents	1 36
Raking, 4 hours, 2 horses at 34 cents	1 36
Hauling, 6 hours, 2 horses at 34 cents	2 04
Loading, unloading, 18 hours at 17 cents	3 06
Cost of 3 acres	44 63
Cost per acre	14 88
Yield per acre tons.	1·25
Cost per ton	11 90

STE. ANNE DE LA POCATIERE.

In the following table is summarized the cost of production of wheat, barley, oats, peas, roots, corn, potatoes, and hay.

YIELDS and Costs of Production of Field Crops, Ste. Anne de la Pocatière, Que., 1915.

Crop.	Area.	Yield per acre.		Cost of production.		
	Acres.	Tons Lb.	Bush. Lb.	Per acre.	Per Ton.	Per Bush.
				$ cts.	$ cts.	Cents.
Wheat	1	.....	39 30	23 34	.....	59·6
Barley	2	.....	34 00	20 92	.....	68·53
Oats	3	.....	76 00	22 01	.....	28·96
Peas	1	.....	33 00	21 61	.....	65·50
Roots	2	22 200	736 10	41 36	1 86	5·61
Corn	10	11	.....	29 26	2 66	.....
Potatoes	1	.....	301 00	79 15	.....	26·30
Hay	17	1 500	.....	14 88	11 90	.....

CROP ROTATION.

On a well-managed farm, the selection of the crops cannot be made in a haphazard way. It requires the best attention of the farmer, as the success of the farming operations depends upon it to a large extent. The main factor for success in crop management is not so much to "get a good crop," but rather to find the exact proportions in which the various crops should be grown, to ensure a profit and at the same time keep the soil in a good state of fertility. One must therefore endeavour to strike a happy medium between the fertility of the soil and the requirements of the plants entering into the rotation, having the crops follow each other in such a way that each will prepare the soil in part at least for the one that is to follow.

The following three rotations of different duration are under test and seem to be admirably suited to the conditions of the average farm of this district:—

ROTATION "A" (FIVE YEARS' DURATION).

First year.—Hoed crop of corn or roots. For corn, manure applied at rate of 25 tons per acre in spring and ploughed under. After crop is harvested, land is shallow ploughed or cultivated.

Second year.—Grain. Seeded down with 10 pounds red clover, 2 pounds alsike and 12 pounds timothy per acre.

Third year.—Clover hay. Cut twice if possible.

Fourth year.—Timothy hay or pasture. Ploughed shallow in August, top-worked and re-ploughed or ridged up in late autumn.

Fifth year.—Grain. Seeded down with 10 pounds red clover which is allowed to grow to be turned under following spring, when the hoed crop is corn.

ROTATION "C" (FOUR YEARS' DURATION).

First year.—Hoed crop of corn or roots.

Second year.—Grain. Seeded down with 10 pounds red clover, 2 pounds alsike and 12 pounds timothy per acre.

Third year.—Clover hay. Cut twice if possible.

Fourth year.—Timothy hay. Field ploughed shallow in August, top-worked and re-ploughed or ridged up in late autumn.

STE. ANNE DE LA POCATIERE.

ROTATION "D" (THREE YEARS' DURATION).

First year.—Hoed crop of corn or roots. For corn, land is manured, 15 tons per acre, and ploughed in spring; for roots it is manured and ploughed in fall.

Second year.—Grain. Seeded down with 10 pounds red clover, 2 pounds alsike, 6 pounds alfalfa and 6 pounds timothy per acre.

Third year.—Clover hay. Cut twice if possible.

The following summary is given of the costs, returns, and net profits of rotations "D," "C," and "A" for the year 1915.

Costs, Returns, and Net Profits of Rotations "D," "C," "A," 1915.

Rotation.	Cost of operations per acre.	Value of returns per acre.	Profit per acre.
	$ cts.	$ cts.	$ cts.
D (three years)	23 65	26 09	2 44
C (four years)	16 85	18 96	2 11
A (five years)	15 43	17 25	1 82

The following fixed values are being used each year in determining cost of production and value of product:—

Cost Values.

Manual labour ..per hour.	$0 17
Horse labour, including teamster, 1 horse .. "	27
" " " " 2 horses .. "	34
" " " " 3 " .. "	41
" " " " 4 " .. "	48
Rent of land ..per acre.	3 00
Machinery (thresher included) .. "	60
Barnyard manure (spread) ..per ton.	1 00
Commercial fertilizers charged at cost.	
Seed wheat, oats, barley, buckwheat and rye ..per acre.	1 00
Seed peas .. "	2 00
Grass and clover seed charged at cost.	
Total cost to be distributed over the number of years in hay and pasture.	
Turnips, mangels, and corn seed, charged at cost.	
Twine, charged at cost.	
Threshing charged according to actual labour expended, the items charged under this head to include only such operations as begin after the load of grain arrives at the feed table, or after the grain is stacked or placed in the mow ready to be thrown on the feed table. Loading, hauling, etc., to be charged to manual and horse labour.	

Return Values.

Wheat, oats, barley, rye and buckwheat ..per pound	$0 01
Peas .. "	1¼
Hay (timothy, clover, alfalfa or mixture) ..per ton.	7 00
Straw (wheat, oats, barley and buckwheat) .. "	4 00
Corn silage .. "	2 00
Sugar beets .. "	3 00
Forage crops (cut green) .. "	2 00
Turnips, carrots, mangels .. "	2 00
Potatoes ..per bushel.	50
Pasture—	
Horses, per head ..per month.	1 00
Cattle, per head .. "	1 00
Sheep, per head .. "	25

Ste. Anne de la Pocatiere.

The items for which there are no fixed charges have been valued as follows:—

Twine	per pound.	$0 12
Red clover	"	28
Alsike clover	"	30
Alfalfa	"	22
Timothy	per bushel.	7 50
Mangel seed	per pound.	25

IMPROVEMENTS.

Six acres of land were cleared and ploughed during the season of 1915. Most of the stumps were removed by means of a double block and tackle, while the large stumps were removed by means of dynamite. The large quantity of stones gathered from this area were used on roadways and for other purposes.

DRAINAGE.

Abont 28,950 feet of tile were laid, the area thus drained comprising 19 acres of heavy clay land. The drains varied in depth from 3 feet 4 inches to 5 feet, and were placed 30 feet apart. A statement of the quantity used, the cost of material and the cost of laying is given herewith.

Quantity.	Material.	Price.		Cost.
		per thousand	per hundred	
		$ cts.	$ cts.	$ cts.
1,000	6 inch tile	56 00	.....	56 00
850	5 " "	41 00	.....	30 75
27,100	3 " "	22 75	.....	615 30
48	6 x 3 inch Y joints	.....	45 00	21 70
1,430	Broken tile.	30 00	.....	42 90
	Dynamite caps and fuse	.....	.....	98 50
Cost of material for 19 acres		.....	.....	865 15
Cost of laying tile for 19 acres		.....	.....	2,054 39
Total cost of material and laying tile for 19 acres		.....	.....	2,919 54
Cost of material per acre		.....	.....	45 53
Cost of laying tile per acre		.....	.....	108 13

EXPERIMENTAL STATION FOR CENTRAL QUEBEC, CAP ROUGE, QUE.

REPORT OF THE SUPERINTENDENT, G. A. LANGELIER.

THE SEASON.

The five months during which field crops make the largest part of their growth in this district, May, June, July, August, and September, were a little warmer, drier, and duller than the average for the past three years, the mean temperature of 1915 for this period being 1·07 degree higher, the precipitation 0·67 inch less, and the number of hours of sunshine 5·2 fewer than the average during 1911-12-13. The last killing frost occurred on May 16, and the first one was on October 23, which made the growing season about thirty days longer than usual.

Practically all field crops yielded more in 1915 than in 1914. Cereals were better than they have been for a long time, whilst corn for ensilage and swedes were a little above, and hay somewhat below, the average of the last five years

Some Weather Observations taken at Cap Rouge, 1915.

	Temperature F.			Precipitation.				Total Sunshine.
	Highest.	Lowest.	Mean.	Rainfall.	Snowfall.	Total.	Heaviest in 24 hours.	
	°	°	°	Inches.	Inches.	Inches.	Inches.	Hours.
January	45·0	−21·8	12·75	1·18	16·6	2·84	0·70	52·9
February	34·0	−14·9	16·37	1·80	17·0	3·50	0·70	78·2
March	40·0	5·2	22·30	. . .	3·2	0·32	0·24	136·7
April	71·0	20·2	40·18	2·04	.....	2·04	0·54	178·6
May	76·0	31·2	48·20	3·14	.....	3·14	0·90	205·7
June	85·0	38·2	60·54	2·63	.....	2·63	0·93	225·0
July	85·0	46·2	64·66	1·63	.....	1·63	0·72	246·9
August	87·0	35·2	63·71	3·30	.....	3·39	0·64	162·8
September	84·0	32·2	56·95	5·31	.....	5·31	2·90	163·9
October	68·0	27·2	46·11	3·06	.....	3·06	0·90	107·8
November	50·0	19·2	32·60	1·93	2·5	2·18	0·50	73·6
December	40·0	− 3·1	21·09	.....	28·3	2·83	0·60	36·2
Total for year				26·16	67·6	32·92	.....	1653·3
Average of four years				.....	.....	41·18	.....	1670·6
Total for six months, May to October				.....	.....	19·21	.....	1112·1
Average of four years for six growing months, May to October				.....	.. ..	22·50	.....	1113·9

WORK IN FIELD HUSBANDRY.

Work in field husbandry, at this Station, comprises crop management, soil management, and agricultural engineering.

CROP MANAGEMENT.

Under crop management come crop yields, cost of production of field crops, rotation of crops, and experimental work.

CROP YIELDS.

Of the main crops, hay was somewhat below, swede turnips and corn for ensilage a little above, and oats much better than the average of the last four years. The varieties named in the following table are the ones which seem best adapted to this region:—

FIELD Crop Areas and Yields, Cap Rouge, 1915.

Crop.	Variety.	Area.	Total Yield.				Average yield per acre.			
		Acres.	Tons	Lb.	Bush.	Lb.	Tons	Lb.	Bush.	Lb.
Indian corn	Longfellow	17·84	153	1,980			8	1,264		
Swede turnips	Good Luck	5·00	91	725			18	545		
Oats	Banner	15·00			1,067	22			71	6
Barley	Manchurian	4·00			108	22			27	5
Wheat	Huron	1·41			32	00			22	22
Peas	Arthur	1·81			33	00			18	14
Hay	Clover	15·00	23	275			1	1,085		
Hay	Timothy	14·20	20	1,505			1	923		

COST OF PRODUCTION OF FIELD CROPS.

Accurate records were kept of the cost of production of the three main crops of this district, swede turnips, oats, and hay, on 18 acres of land.

COST OF PRODUCTION OF SWEDE TURNIPS.

The figures herewith given are for 5 acres of "Good Luck" swede turnips, three of which were grown after clover and two after oats in rotations of three, four, five, and six years' duration. The soil ranged from a light sandy loam to a moderately heavy clay loam. The subsoil was shale, and the land was tile-drained.

Number of acres, 5.

Rent of land at $3 per acre	$ 15 00
Share of manure, at rate of 12 tons per acre, at $1 per ton	20 00
Use of machinery at 60 cents per acre	3 00
Seed, 25 pounds at 25 cents per pound	6 25
Ploughing in summer and in autumn, 75 hours 2-horse team at 34 cents	25 50
Double-discing in spring, 33¾ hours 3-horse team at 41 cents	13 63
Harrowing, 6½ hours 2-horse team at 34 cents	2 21
Rolling twice, 5 hours 1-horse team at 27 cents	1 35
Ridging, 20 hours 2-horse team at 34 cents	6 80
Sowing, 10 hours 1-horse team at 27 cents	2 70
Singling and hoeing, 211 hours manual labour at 17 cents	35 87
Cultivating, 4 hours 1-horse team at 27 cents	1 08
Cultivating, 25 hours 2-horse team at 34 cents	8 50
Pulling, topping, loading, storing, 221½ hours manual labour at 17 cents.	37 65
Hauling, 91½ hours 1-horse team at 27 cents	24 71
Total cost for 5 acres	$204 25
Cost per acre	40 85

Yield of roots per acre, 18 tons 545 pounds.
Cost to produce 1 ton, $2.24.

COST OF PRODUCTION OF OATS.

Six acres of "Banner" oats were grown after swede turnips in rotations of three, four, five, and six years' duration. The soil, tile-drained, ranged from a sandy to a light clay loam. The subsoil was shale.

Number of acres, 6.

Rent of land at $3 per acre	$ 18 00
Share of manure, at rate of 12 tons per acre, at $1 per ton	24 00
Use of machinery at 60 cents per acre	3 60
Seed, $1 per acre	6 00
Ploughing in autumn, 30 hours 2-horse team at 34 cents	10 20
Double-discing in spring, 33 hours 3-horse team at 41 cents	13 53
Harrowing, 6 hours 2-horse team at 34 cents	2 04
Rolling twice, 8 hours 1-horse team at 27 cents	2 16
Sowing, 7¾ hours 2-horse team at 34 cents	2 63
Passing weeder after rolling, 3 hours 2-horse team at 34 cents	1 02
Pulling weeds, 8 hours manual labour at 17 cents	1 36
Cutting, 9 hours 2-horse team at 34 cents	3 06
Stooking, 11½ hours manual labour at 17 cents	1 95
Loading, 25½ hours manual labour at 17 cents	4 33
Hauling, 46¼ hours 2-horse team at 34 cents	15 72
Twine, 12 pounds at 12½ cents	1 50
Threshing, 1·6 cent per bushel of 34 pounds	8 16
Total cost for 6 acres	$119 26
Cost per acre	19 88

Yield of grain per acre, 2,457 pounds or 72 bushels 9 pounds.
Cost to produce 1 bushel (34 pounds) of grain, 20 cents.

CAP ROUGE.

COST OF PRODUCTION OF HAY.

Records were kept of the cost of production of 7 acres of hay, 3 of clover, and 4 of timothy. Of the latter, 2 acres had been seeded down two years, 1 acre three years, and 1 acre four years before. The soil, ranging from a light to a heavy sandy loam, is not well adapted to hay growing.

Number of acres, 7.	
Rent of land at $3 per acre	$ 21 00
Share of manure, at rate of 12 tons per acre, at $1 per ton	28 00
Use of machinery at 60 cents per acre	4 20
Share of seed, at rate of 6 pounds timothy, 10 pounds red clover, 3 pounds alsike per acre for a three-year rotation, and 12 pounds timothy, 8 pounds red clover, 2 pounds alsike per acre for four-year and longer rotations: 30 pounds timothy at 12½ cents, 26 pounds red clover at 23 cents, and 7 pounds alsike at 23 cents	11 34
Cutting, 3½ hours 2-horse team at 34 cents	1 19
Tedding, 7 hours 1-horse team at 27 cents	1 89
Side-delivery raking, 3½ hours 2-horse team at 34 cents	1 19
Raking, after loader, 3½ hours 1-horse team at 27 cents	94
Loading, 6½ hours 2-horse team at 34 cents, and 7 hours manual labour at 17 cents	3 41
Unloading, 7 hours 2-horse team at 34 cents, 3 hours 1-horse team at 27 cents, and 9½ hours manual labour at 17 cents	4 80
Total cost for seven acres	77 96
Cost per acre	11 14
Yield of hay per acre, 2,992 pounds.	
Cost to produce 1 ton, $7.45.	

ROTATION OF CROPS.

The essentials of a good rotation are that it should give a net profit whilst maintaining or increasing fertility. There is no one best rotation, because different systems will be adapted to the particular conditions of each place, taking into consideration soil, climate, and line of farming. There are, however, certain general principles which must not be forgotten, such as the conserving of vegetable matter, the keeping of the land in good physical condition, and the preventing of the growth of weeds. Some of the best means of reaching this end are to use manure on the hoed crop, which should follow grass, to grow grain after a hoed crop, or, if this is not possible, after a clover sod, and to always seed down to grasses and clovers with the grain crop. One of the good results which generally follow the adoption of a system of rotation by a farmer is that instead of thinking only of the present, he is looking ahead and planning for the future, preparing his land for crops one, two or even five or six years in advance. By knowing what will grow on his fields several years hence, he can make arrangements for the best use of his crops.

Four rotations are under test at this Station:—

ROTATION "D" (THREE YEARS' DURATION).

First year.—Corn or roots.

Second year.—Grain. Seeded down with 10 pounds red clover, 3 pounds alsike, and 6 pounds timothy per acre.

Third year.—Clover hay. Two crops when weather conditions permit.

Three fields of 1 acre each are used for this rotation. The soil is a rather poor sandy loam with shale at about 2 feet from the surface; it is well drained but apt to suffer from drought as it is on the highest part of the Station, where the wind dries the surface very rapidly.

This rotation is very intensive and can be used where there is rough land to be pastured. It will produce the largest quantity of feed for dairying or stock feeding, where land is high priced and easily worked.

As soon as possible after the hay is taken off, the land is ploughed about 4 inches deep and as flat as possible to ensure a quick rotting of the turf. It is rolled and cultivated often to kill weeds and conserve moisture. Late in the autumn it is cross-ploughed about 5 or 6 inches deep, a more upright furrow being turned this time so as to leave a larger surface exposed to the action of the frost. Manure is applied either during winter or the following spring when the land is double-disced twice, harrowed, rolled, ridged in drills 30 inches apart, and sown to swede turnips at the rate of 5 pounds per acre. If corn is planted, it is put on the flat, in rows 42 inches apart. After harvesting the swedes or corn, the land is ploughed and left as rough as possible, but experiments will soon be undertaken to see if it would not be better practice to disc thoroughly during autumn and the following spring rather than plough, so as to ensure a better catch of grass and clover with the grain.

ROTATION "C" (FOUR YEARS' DURATION).

First year.—Corn or roots.

Second year.—Grain. Seeded down with 8 pounds red clover, 2 pounds alsike and 12 pounds timothy per acre.

Third year.—Clover hay. Two crops when weather conditions permit.

Fourth year.—Timothy hay or pasture.

Four fields of 1 acre each are used for this rotation. The soil is a clay loam of average fertility, with shale at depths varying from 2 to 3 feet. It is drained and, being just next to, and lower than, the area used for the three-year rotation, does not suffer from drought nearly as much.

This rotation is intensive and can be used where the area to be tilled is larger and the price of land lower than in the case of the three-year rotation. If it is desired to add to the stock-carrying capacity of the land, part of the aftermath of the third-year crop may be cut for soiling, and part of the fourth-year crop may be left to grow timothy for horses.

The preparatory treatment for roots or corn is the same as for rotation "D." When the stock is left on the land late in the autumn, only one ploughing is given, with a fairly upright furrow. The following spring, the ground is rolled as early as possible, cross-ploughed, double-disced twice, and harrowed, in preparation for swedes or corn.

ROTATION "B" (FIVE YEARS' DURATION).

First year.—Corn or roots.

Second year.—Grain. Seeded down with 8 pounds red clover, 2 pounds alsike, and 8 pounds timothy per acre.

Third year.—Clover hay. Two crops when weather conditions permit.

Fourth year.—Grain. Seeded down with 8 pounds red clover, 2 pounds alsike, and 8 pounds timothy per acre.

Fifth year.—Clover hay. Two crops when weather conditions permit.

Five fields of one acre each are used for this rotation.

The soil is a sandy loam of more than average fertility, with shale at depths varying from 2 to 3 feet; it is drained and, most of the area being rather low lying, it very seldom suffers from drought.

This is a very good rotation for the dairyman or feeder who has to pay high prices for grain and straw, as it gives a large proportion of both of these. By using one entire lot of clover and the aftermath of the other for soiling, this rotation can be made to carry a large number of stock. Two disadvantages are that there is no timothy for horses, and also that, if clover fails, a large part of the roughage has

to be bought. It could, however, very well be extended to a seven-year rotation by leaving two years in hay instead of one, having roots or corn, grain, clover, timothy. In this case it would be better to use 12 pounds instead of 8 pounds of timothy seed per acre.

In preparing land for hoed crops, the clover sod is treated as in rotation "D." If it is intended to use the seven-year rotation, or when the stock is to be left on the land late in the autumn, the sod is treated as in rotation "C"

ROTATION "K" (SIX YEARS' DURATION).

First year.—Corn or roots.

Second year.—Grain. Seeded down with 8 pounds red clover, 2 pounds alsike, and 12 pounds timothy per acre.

Third year.—Clover hay.

Fourth year.—Timothy hay.

Fifth year.—Timothy hay or pasture.

Sixth year.—Timothy hay or pasture.

Six fields of 1 acre each are used for this rotation.

The soil is a sandy loam of average fertility, fairly well drained, and shale is about 2 feet from the surface. There are a few small areas where rock is near the surface, and these easily suffer from drought.

This rotation requires the least amount of manual labour but, on the other hand, it will not produce the maximum quantity of crops nor control weeds as well as shorter rotations. It is especially recommended to farmers who follow no particular rotation and who wish gradually to improve their methods. If there is enough manure for only 5 or 6 acres of hoed crops, then 30 to 36 acres of the farm can be put under this system and the area can soon be increased when more stock is kept on account of the greater production of the farm.

The ground for hoed crops is prepared as in rotation "D." unless stock is to be kept on the land late in the autumn, when the sod should be treated as in rotation "C."

COST AND RETURN.—Values Used in Rotation Work.

Cost values—		
Manual labour	per hour	$0 17
One-horse team, including driver	"	27
Two-horse team, including driver	"	34
Three-horse team, including driver	"	41
Rent	per acre.	3 00
Machinery (including thresher)	"	60
Manure (spread), always applied at the rate of four tons per acre, for each year of the rotation	per ton.	1 00
Seed, oats	per acre.	1 00
" swedes, actual cost	per pound.	25
" timothy, actual cost	"	12½
" red clover, actual cost	"	23
" alsike, actual cost	"	23
(The total cost of grass and clover seed is divided amongst the number of years in hay or pasture).		
Twine, actual cost	"	12½
(Threshing is the actual cost of manual labour after the grain reaches the machine until it and the straw are ready to be hauled away.)		
Return values—		
Swedes	per ton.	2 00
Hay (timothy, clover, or mixed)	"	7 00
Straw	"	4 00
Oats	per pound	01

CAP ROUGE.

The following table contains details in connection

ROTATION

Rotation Year.	Crops.		Area.	Items of Expense									
				Rent and manure.	Seed, twine and use of machinery.	Manual labour.		Horse labour (including teamster).					
								Hours.					
						Hours.	Cost.	Single horse	2-horse team.	3-horse team.	4-horse team.	5-horse team.
	1914.	1915.	Ac.	$ c.	$ c.	No.	$ c.	No.	No.	No.	No.	No.
1st..	Hay.....	Roots.....	1	7 00	S. 1 25 M. 0 60	86·75	14 75	27	25	6·25	.....	.....
2nd.	Swedes.....	Grain (Oats)...	1	7 00	S. 1 00 T. 0 25 M. 0 60	7·50	1 27	2	17	7·0	.....	.....
3rd.	Grain	Hay.....	1	7 00	S. 3 74 M. 0 60	2·0	0 34	½	3	....	.....	.....
	Aggregate..		3	21 00	8 04	96·25	16 36	27·50	45	13·25	.....	.....
	Average per acre, 1915.....		.....	7 00	2 68	32·08	5 45	9·17	15	4·42	.....	.....

ROTATION

3rd.	Oats.....	Hay.....	1	7 00	S. 1 90 M. 0 60	3·5	0 59	2	3	.....	.....	.....
4th.	Hay.....	Hay.....	1	7 00	S. 1 90 M. 0 60	2·5	0 43	2	3	.....	.....	.....
1st..	Hay.....	Swedes.....	1	7 00	S. 1 25 M. 0 60	88·75	15 09	23·5	25	7·5	.....	.....
2nd.	Swedes.....	Oats.....	1	7 00	S. 1 00 T. 0 25	7·00	1 19	2	16¾	5·0	.....	.....
	Aggregate.....		4	28 00	8 70	101·75	17 30	29·5	47·75	12·5	.....	.....
	Average per acre, 1915.....		.....	7 00	2 17	25·44	4 32	7·4	11·94	3·1	.....	.....

ROTATION

1st..	Hay.....	Swedes.....	1	7 00	S. 1 25 M. 0 60	88	14 96	24	26½	7½	.....	.....
2nd.	Swedes.....	Oats.....	1	7 00	S. 1 00 M. 0 60 T. 0 25	7	1 19	1	17	6	....	.....
3rd.	Grain (Oats)..	Hay.....	1	7 00	S. 0 95 M. 0 60	2·5	0 42	2	3	.....	.....	.....
4th.	Hay.....	Hay.....	1	7 00	S. 0 95 M. 0 60	2·5	0 43	2	3	.....	.....	.....
5th.	Hay.....	Hay.....	1	7 00	S. 0 95 M. 0 60	2·5	0 42	2	3	.....	.....	.....
6th	Hay.....	Hay.....	1	7 00	S. 0 95 M. 0 60	1·0	0 17	2	2½	.....	.....	.....
	Aggregate.....		6	42 00	9 90	103½	17 59	33	55	13½	.....	.....
	Average per acre, 1915.....		.....	7 00	1 65	17·2	2 93	5·5	9·1	2·3	.....	.....

with three of the above four rotations:—

"D" (three years' duration).

in Raising Crop.							Particulars of Crop.						
							Weight.						
Value of horse labour.	Cost of threshing.	Total cost.	Cost for 1 acre.	Cost for 1 bushel.	Cost for 1 ton.	Height of stubble.	Grain.	Straw.	Hay.	Hoed crop.	Total value.	Value of crop per acre.	Profit or loss per acre.
$ c.	$ c.	$ c.	$ c.	Cts.	$ c.	In.	Lb.	Lb.	Lb.	Lb.	$ c.	$ c.	$ c.
18 35	....	41 95	41 95	.....	2 02	.....	.....	.....	.....	41,630	41 63	41 63	−0 32
9 19	1 36	20 67	20 67	29·5	.....	30	2,380	2,275	.....	.....	28 35	28 35	7 68
1 42	...	13 10	13 10	.....	12 94	.....	.....	.....	2,025	.....	7 08	7 08	−6 02
28 96	1 36	75 72	...	.....	...	.....	.....	.....	.....	.....	77 06	...	..
9 65	0 45	....	25 24	.....	.....	..	.....	.....	.....	.....	.....	25 69	0 45

"C" (Four years' duration).

1 56	.....	11 65	11 65	.....	.....	.....	.....	.....	3,950	.....	13 82	13 82	2 17
1 56	....	11 49	11 49	.....	.....	.....	.....	.....	3,025	.....	10 59	10 59	−0 91
17 92	....	41 86	41 86	.....	2 04	.....	.....	.....	.....	41,000	41 00	41 00	−0 86
8 28	1 36	19 68	19 68	37·3	...	30	1,791	1,969	.....	.....	21 85	21 85	2·17
29 32	1 36	84 68	.....	.....	.....	.....	.....	.....	.....	.....	87 26	...	..
7 33	0 34	.....	21 17	.....	.....	.....	.....	.....	.....	.....	.....	21 82	0 65

"K" (Six years' duration).

18 56	...	42 37	42 37	.....	2 58	.....	.....	.....	.....	32,805	32 80	32 80	−9 57
8 51	1 36	19 91	19 91	31·2	.....	30	2,169	1,706	.....	.....	25 10	25 10	5 19
1 56	...	10 53	10 53	.....	6 42	.....	.....	.....	3,280	.....	11 48	11 48	0 95
1 56	.....	10 54	10 54	.....	5 91	.....	.....	.....	3,560	.....	12 46	12 46	1 92
1 56	.....	10 53	10 53	.....	6 61	.....	.....	.....	3,184	.....	11 14	11 14	0 61
1 39	.....	10 11	10 11	.....	10 57	.....	.....	.....	1,912	.....	6 69	6 69	−3 42
33 14	1 36	103 99	.....	.....	...	.....	.....	.....	.....	...	93 67	...	..
5 52	0 23	....	17 33	....	...	.....	.....	.....	.....	.....	.....	16 61	−0 72

ROTATIONS—Cost, Returns, Profits or Losses.

Rotation.	Years' Duration.	Per acre, 1915.			Per acre. Average of five years.		
		Cost.	Returns.	Profit or Loss.	Cost.	Returns.	Profit or Loss.
		$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
"D"	3	25 24	25 69	0 45	25 42	20 83	−4 59
"C"	4	21 17	21 82	0 65	20 40	17 76	−2 64
"K"	6	17 33	16 61	−0 72	19 77	19 06	−0 71

BRINGING BACK FERTILITY TO WORN-OUT SOILS BY ROTATING CROPS.

The profits per acre for 1915, in the above table, no doubt look rather small. It must, however, be remembered that the ground chosen for this work is the poorest on the Station. In 1911, the average return per acre, for rotations "D," "C" and "K" was $15.05, whilst in 1915, which was not as favourable a season as 1911, it was $21.37. This is an increase of 42 per cent.

There seems to be no doubt that it would have taken many years of haphazard work to reach the same end.

EXPERIMENTAL WORK.

Five projects are under investigation: (1) planting fodder corn in drills versus hills; (2) rates of seeding oats; (3) rates of seeding clover and timothy; (4) effect on yield of hay of quantity of grain sown as a nurse crop; (5) effect on yield of hay of different kinds of nurse crop.

PLANTING FODDER CORN IN DRILLS VERSUS HILLS.

Longfellow corn has been used exclusively during five years, and it was sown at different spaces, both in rows and in hills. The total crop grown on 57·3 acres was weighed. The following table gives yields in 1915 and the average yields for five years:—

PLANTING Corn in Hills *versus* Drills.

Method of planting.	Yield per acre. 1915.		Yield per acre. Average of 5 years.	
	Tons.	Lb.	Tons.	Lb.
In drills 48 inches apart, plants 8 inches apart in row	7	1,289	10	759
In drills 42 inches apart, plants 8 inches apart in row	9	255	10	185
In hills 36 inches apart, every direction	9	482	6	402
In hills 42 inches apart, every direction	8	367	6	358

RATES OF SEEDING OATS.

Twenty-six plots of one-sixtieth of an acre were used each year since 1913, inclusive, the experiment being made in duplicate for each rate of seeding, which was from 1 to 4 bushels, increasing by quarters of a bushel. The soil was a sandy loam. The following table shows in detail the results of this experiment both for 1915 and for an average of three years:—

Rates of Seeding Oats.

Rates of seeding per acre.	Yield per acre, 1915.		Average yield per acre, 1913-14-15.	
	Bush.	Lb.	Bush.	Lb.
1 Bushel	49	14	48	14
1¼ "	52	19	47	14
1½ "	53	7	57	3
1¾ "	68	28	56	29
2 "	63	10	51	25
2¼ "	72	25	56	32
2½ "	72	17	63	25
2¾ "	66	6	57	26
3 "	83	10	62	7
3¼ "	70	29	62	24
3½ "	65	11	56	7
3¾ "	81	6	67	27
4 "	53	12	55	24

The above figures give the net yield, that is, the total yield minus the amount of seed.

The rate of 2½ bushels per acre, generally used for oats, comes second, for an average of three years, but the experiment must continue for a number of years yet before definite conclusions can be reached. It is, however, interesting to note that on a sandy loam, in this district, it would be better to use more rather than less seed, as the six rates below 2½ bushels averaged 53 bushels 2½ pounds per acre, whilst the six rates above 2½ bushels averaged 60 bushels 13½ pounds.

YIELD OF HAY WHEN NURSE CROP IS SOWN AT DIFFERENT RATES.

From 1912 to 1915, inclusive, all plots used for this experiment were seeded down with a mixture of 12 pounds timothy, 8 pounds red clover, and 2 pounds alsike per acre. In 1915, contrary to what was expected, after noting the results for the two previous years, there was more hay after the heavy seedings of oats than there was after light seedings. Where the rate of seeding was 2¾ bushels or more per acre the yield of hay per acre was 2,600 pounds. Where the rate of seeding was 2¼ bushels or less the yield of hay per acre was 2,370 pounds. The average of three years, however, shows a yield of 2,490 pounds of hay per acre after a light seeding and 2,008 pounds per acre after a heavy seeding. This is a difference of 24 per cent in favour of the lighter seeding of oats as a nurse crop.

RATES OF SEEDING CLOVER AND TIMOTHY.

From 1912, inclusive, on a certain number of one-sixtieth acre plots, oats were sown with timothy, red clover and alsike. On one half the number of plots, 12 pounds timothy, 8 pounds red clover, and 2 pounds alsike were used per acre, whilst on an equal number only half of these quantities were used. This experiment was made on twenty-six plots in 1915, and on sixty-three since 1912. In 1915 the yield of hay was

2,469 pounds per acre with the heavy seeding and 1,809 with the light seeding, or a difference of over 36 per cent. The average for three years shows a yield of hay of 2,262 pounds per acre for the heavy seeding and 1,883 pounds for the light seeding, or a difference of over 20 per cent.

YIELD OF HAY WITH DIFFERENT NURSE CROPS.

Since 1912, inclusive, all the trial plots of cereals are sown with a mixture of 12 pounds timothy, 8 pounds red clover, and 2 pounds alsike per acre. The following table gives results for 1915 and for an average of three years:—

Kind of grain.	Number of plots.	Yield of hay per acre, 1915.	Number of plots.	Average Yield of hay, per acre, for 3 years.
		lb.		lb.
Peas	13	3,276	29	3,622
Barley	9	3,276	24	3,394
Wheat	12	3,318	41	3,210
Oats	18	2,862	40	2,636

The most interesting part of these results is to note that there is a better crop of hay after peas than after either wheat or barley, though it was expected that oats would give poor results.

Soil Management.

No experiments have been started in soil management, but a very uniform piece of clay loam was drained in 1914, and will be used for this purpose in 1918 and afterwards. The area comprises about 8 acres, and the land has not received any manure or fertilizer. Swede turnips were grown in 1915, and oats will be sown in 1916, with grass and clover seed. It is expected that some information will thus be gained about the inherent fertility of each future plot, so that results of different methods of soil management may be better analyzed.

Agricultural Engineering.

A good deal of work was done at this Station during 1915 in draining, fencing, roadmaking, and adding to the waterworks system.

Draining.

Practically all the farm is now drained, and 7,575 feet of tile were put in during this season. The experience of the past shows that nothing smaller than a 3-inch tile should be used, as the 2-inch tile clogs very easily. Another lesson learned was that heavy clay lands should not be tiled too deeply if the system is to work satisfactorily, and a depth of more than 3 feet is not advised. For lighter soil, however, a depth of 4 and even 5 feet is not too much, when it is absolutely necessary.

Fencing.

All the poultry area, a paddock for horses, the orchards, and the entrance to the Station were fenced, a total length of 7,870 feet being erected, all with No. 9 wire, posts being set every 15 feet. In the long run, it will be found a saving to use concrete in very bad places where posts are liable to move on account of the looseness of the soil or because rock or shale is near the surface. Usually, too little attention is paid to end and corner posts, which should always be set down at least 3 feet, and well braced. The ordinary wire fencing may not be too good, and it is often called upon to bear extra strain, on account of lack of attention when putting in posts. It must not be forgotten that posts are to a fence what the foundation is to a building.

Cap Rouge.

EXPERIMENTAL FARM FOR MANITOBA, BRANDON, MAN.

REPORT OF THE SUPERINTENDENT, W. C. McKILLICAN, B.S.A.

THE SEASON.

The season of 1915 will live in the memories of the people of Manitoba as one of the most remarkable in the history of the country. Despite the facts that the rainfall was considerably below average, that severe frosts continued until nearly the end of June and in some districts even into July and began again on August 23, yet the crop of grain was the largest in the history of the country. The rainfall, though light, was timely, and the low temperature was conducive to the saving of moisture. The cold frosty weather in May and June that appeared to be dwarfing the crop, must in reality, have caused strong, sturdy root development, which later produced a phenomenal crop. August was dry and fairly hot and brought to maturity, in good time, a crop which had appeared to be dangerously late.

While the grain crop appears to have thriven on the season's peculiarities, it was not so with forage crops. Corn was practically a complete failure throughout the country. It was particularly unfortunate that this corn failure came this year, as a greatly increased acreage had been planted, and many were trying it for the first time. Hay crops were a partial failure, and potatoes much below average.

The fall was very unfavourable for threshing. Frequent light showers, totalling very little rainfall but spread out so as to prevent stooked grain from getting properly hardened, delayed threshing very seriously. When snow came in November, there was still a considerable area of unthreshed crop in Manitoba.

Meteorological Records for Brandon, 1915.

Month.	Temperature F.			Precipitation.				Total sunshine.
	Mean.	Highest.	Lowest.	Rainfall.	Snowfall.	Total.	Heaviest in 24 hours.	
	°	°	°	Inches.	Inches.	Inches.	Inches.	Hours.
January	−1·0	30·5	−42·5	. .	7	0·70	·40	98·5
February	14·1	32·0	−20·0	. .	2	0·20	·10	85·8
March	23·1	52·1	−15·8	. . . .	4	0·40	·40	193·3
April	46·4	87·2	15·0	1·07	. . . .	1·07	·32	164·2
May	47·0	83·2	20·0	0·98	3	1·28	·65	225·4
June	55·6	85·0	31·5	3·81	. . . .	3·81	·96	164·9
July	60·5	86·5	36·5	2·34	. . . .	2·34	·73	202·5
August	64·6	94·7	26·0	0·18	. . . .	0·18	·11	257·1
September	50·8	94·5	26·2	3·29	. . . .	3·29	·35	106·9
October	42·4	71·0	17·0	0·24	4	0·64	·20	180·7
November	20·8	61·0	− 7·9	. . . .	11	1·10	·70	74·6
December	8·3	33·0	−27·8	. . . .	16	1·60	·70	72·9
Total for year				11·91	47	16·61	. . . .	1,826·8
Average for 10 years				12·80	50·2	17·82	. . . .	1,989·2
Total for 6 growing months, April to September				. . . .	. . . .	11·97	. . . .	1,147·6
Average of 10 years for 6 growing months, April to September				. . . .	. . . .	12·34	. . . .	1,277

Brandon.

CROP YIELDS.

The following is the list of field crops for 1915. This list includes the rotation fields but not the small test plots. For obvious reasons, land in fallow or pasture is not included.

FIELD Crop Areas and Yields, Brandon, 1915.

Crop.	Previous Crop.	Area.	Yield.	Yield per Acre.
		Acres.	Bush.	Bush. Lb.
Wheat, Red Fife	Corn (Rotation G.)	6	240	40 00
" Red Fife	Wheat (Rotation G.)	6	184	30 40
" Red Fife	Pasture (Rotation H.)	4·5	117	26 00
" Red Fife	Wheat (Rotation H.)	4·5	131	29 07
" Red Fife	Fallow (Rotation I.)	4·5	145	32 13
" Red Fife	Hay (Rotation F.)	8·5	336	39 32
" Red Fife	Wheat (Rotation F.)	8·5	218	25 39
" Red Fife	Fallow (Rotation D.)	3·5	133	38 00
" Red Fife	Wheat (Rotation D.)	3·5	100	28 34
" Red Fife	Fallow (Rotation E.)	3·5	120	34 17
" Red Fife	Wheat (Rotation E.)	3·5	92	26 17
" Marquis	Alfalfa (Rotation W.)	1·4	66	47 08
" Marquis	Wheat (Rotation W.)	1·73	53	30 38
" Marquis	Fallow	·75	40	53 20
Oats, Banner	Fallow (Rotation H.)	4·5	372	82 23
" Banner	Flax (Rotation I.)	4·5	199	44 08
" Banner	Wheat (Rotation D.)	3·5	124	35 15
" Banner	Wheat (Rotation E.)	3·5	122	34 29
" Banner	Turnips and fallow (Rotation Q.)	5	286	57 7
" Banner	Pasture (Rotation Q.)	4	204	51 00
" Banner	Corn (Rotation W.)	2·54	220	86 21
" Banner	Fallow	10·25	1038	101 9
" Banner	Corn and roots	3	164	54 23
" Daubeney	Oats	2	94	47 00
Barley, O.A.C., No. 21	Corn (Rotation F.)	4	170	42 24
" Manchurian	Corn (Rotation F.)	4·5	221	49 5
" Manchurian	Wheat (Rotation G.)	6	323	53 40
" Manchurian	Oats (Rotation W.)	2·72	116	42 31
Flax, N. D. R. 52	Pasture (Rotation I.)	4·5	62	13 44
Peas, Arthur	Hay	2	30	15 00
			Tons. Lbs.	Tons. Lbs.
Hay, Mixed	Barley (Rotation G.)	6	6 1150	1 192
" Mixed	Oats (Rotation H.)	4·5	4 —	— 1778
" Mixed	Wheat (Rotation I.)	4·5	4 —	— 1778
" Mixed	Barley (Rotation F.)	8·5	5 240	— 1205
" Mixed	Oats (Rotation Q.)	5	3 915	— 1383
" Mixed	Hay (Rotation Q.)	5	5 480	1 96
" Mixed	Hay	18	17 1605	— 1978
" Mixed	Hay	2·75	4 1820	1 1571
" Alfalfa	Alfalfa	11	27 1480	2 1044
" Alfalfa	Alfalfa (seeding down)	4	2 850	— 1212
" Alfalfa	Alfalfa	·6	1 1190	2 1317
Corn, Northwestern Dent	Pasture (Rotation G.)	6	32 184	5 697
" "	Wheat (Rotation F.)	8·5	38 1144	4 1076
" "	Wheat (Rotation W.)	2·1	11 766	5 838
" "	Hay	9	24 397	2 1378
" "	Peas	2	9 957	4 1478
Mangels	Fallow	3·8	70 239	18 905
Turnips	Fallow	2	39 720	19 1360

DATES OF FARM OPERATIONS.

The principal farm operations on this Farm were begun and finished on the following dates:—

——	Began.	Finished.
Work on land	April 9	
" ....stopped by snowstorm		November 7
Seeding wheat	April 9	April 19
" oats	April 16	May 4
" barley	April 29	May 1
" flax	May 4	May 4
" clovers and grasses	April 17	May 1
" alfalfa	May 8	May 28
" mangels	May 14	May 22
" turnips	May 21	May 22
" corn	May 21	May 27
" fall rye	September 11	September 11
Cutting alfalfa—first crop	June 24	July 2
" " second crop	August 16	August 16
" " other hay crops	July 12	July 23
" wheat	August 9	August 20
" oats	August 7	August 24
" barley	August 4	August 6
" flax	August 14	August 16
" corn	August 24	August 26
Threshing	August 28	October 13
Putting corn in silo	August 26	August 27
Harvesting mangels	October 1	October 7
Harvesting turnips	October 15	October 18
Spring ploughing	April 14	May 25
Ploughing summer-fallow (first time)	May 20	June 28
" " (2nd time)	August 10	October 19
Cultivating "	June 30	October 21
Cultivating and hoeing corn and roots	June 9	August 23
Ploughing sod	May 31	August 7
Backsetting sod	August 10	October 22
Fall ploughing (stubble land)	August 7	November 6

COST OF PRODUCTION OF FIELD CROPS.

The records kept in connection with the experiments in rotation of crops give data which show the cost of producing the various farm crops each year. The values used in arriving at the items of cost are those arbitrarily set for all the rotation work of the western Experimental Farms. These are given in detail in another part of the report. It will be observed that the calculations include rent of land, use of machinery, and manure, which might be called overhead charges, as well as actual outlay and labour expended on the crop while it is being produced. The values used remain the same from year to year. Some of them may appear out of accord with actual prices of any one year, but on the whole they are a fair basis of comparison.

The cost of production on the following fields is given as an illustration of the general cost under conditions such as prevail on this Farm:—

Cost of Producing Wheat.

Wheat on Summer-fallow.

Number of acres, 3½.

Preceding crops: Wheat, wheat, wheat, oats, fallow.

Items of cost:

Rent of land, 3½ acres 2 years at $2 per acre	$ 14 00
Ploughing, previous June, man and 4 horses, 10 hours at 48 cents per hour	4 80
Packing, man and 4 horses, 3 hours at 48 cents per hour	1 44
Cultivating, man and 4 horses, 7 hours at 48 cents per hour	3 36
Harrowing, man and 2 horses, 7½ hours at 34 cents per hour	2 55
Seeding, man and 2 horses, 3 hours at 34 cents per hour	1 02
Packing after seeding, man and 4 horses, 1½ hours at 48 cents per hour	72
Binding, man and 3 horses, 4 hours at 41 cents per hour	1 64
Stooking, man, 6 hours at 19 cents per hour	1 14
Threshing, 120 bushels of wheat at 7 cents per bushel	8 40
Use of machinery, 3½ acres 2 years at 60 cents per acre	4 20
Seed, 3½ acres at $1.50 per acre	5 25
Twine	1 62
Total cost for 3½ acres	$ 50 14

Total yield for 3½ acres, 120 bushels.
Yield per acre, 34 bushels 17 pounds.
Cost per acre, $14.33.
Cost per bushel, 42 cents.

Wheat after Alfalfa.

Number of acres, 1·4.

Preceding crop: Alfalfa for 5 years.

Items of cost:

Rent of land, 1·4 acres at $2 per acre	$ 2 80
Ploughing alfalfa in June, man and 4 horses, 7 hours at 48 cents per hour	3 36
Second ploughing in August, man and 4 horses, 6½ hours at 48 cents per hour	3 12
Discing during summer and fall, man and 2 horses, 13½ hours at 34 cents per hour	4 59
Seeding, man and 2 horses, 1½ hours at 34 cents per hour	51
Binding, man and 3 horses, 2½ hours at 41 cents per hour	1 02
Stooking, man, 4½ hours at 19 cents	85
Threshing, 66 bushels wheat at 7 cents per bushel	4 62
Use of machinery, 1·4 acres at 60 cents per acre	84
Seed, 1·4 acres at $1.50 per acre	2 10
Twine	94
Total cost for 1·4 acres	$ 24 75

Total yield for 1·4 acres, 66 bushels.
Yield per acre, 47 bushels 8 pounds.
Cost per acre, $17.68.
Cost per bushel, 37½ cents.

Brandon.

WHEAT AFTER WHEAT.

Number of acres, 6.

Preceding crops: Oats, hay, pasture, corn, wheat.

Items of cost:

Rent of land, 6 acres at $2 per acre	$ 12 00
Manure, one-sixth share of 8 tons per acre at $1 per ton	8 00
Ploughing in September, man and 4 horses, 21 hours at 48 cents per hour	10 08
Discing and harrowing in spring, man and 2 horses, 13 hours at 34 cents per hour	4 42
Seeding, man and 2 horses, 7½ hours at 34 cents per hour	2 55
Binding, man and 3 horses, 7 hours at 41 cents per hour	2 87
Stooking, man, 13 hours at 19 cents per hour	2 47
Threshing, 184 bushels of wheat at 7 cents per bushel	12 88
Use of machinery, 6 acres at 60 cents per acre	3 60
Seed, 6 acres at $1.50 per acre	9 00
Twine	3 00
Total cost for 6 acres	$ 70 87

Total yield for 6 acres, 184 bushels.
Yield per acre, 30 bushels 40 pounds.
Cost per acre, $11.81.
Cost per bushel, 38½ cents.

COST OF PRODUCING OATS.

OATS AFTER FLAX.

Number of acres, 4½.

Preceding crops: Hay, pasture, flax.

Items of cost:

Rent of land, 4½ acres at $2 per acre	$ 9 00
Manure, one-sixth share of 6 tons per acre at $1 per ton	4 50
Ploughing in September, man and 4 horses, 13½ hours at 48 cents per hour	6 48
Discing and harrowing in spring, man and 2 horses, 11½ hours at 34 cents per hour	3 91
Seeding, man and 2 horses, 4½ hours at 34 cents per hour	1 53
Packing, man and 2 horses, 2 hours at 34 cents per hour	68
Binding, man and 3 horses, 4½ hours at 41 cents per hour	1 84
Stooking, man, 7 hours at 19 cents per hour	1 33
Threshing, 199 bushels oats at 4 cents	7 96
Use of machinery, 4½ acres at 60 cents per acre	2 70
Seed, 4½ acres at $1 per acre	4 50
Twine	1 06
Total cost for 4½ acres	$ 45 49

Total yield for 4½ acres, 199 bushels.
Yield per acre, 44 bushels 8 pounds
Cost per acre, $10.11.
Cost per bushel, 23 cents.

OATS AFTER CORN.

Number of acres, 2·54.

Preceding crops: Fallow, wheat, corn.

Items of cost:

Rent of land, 2·54 acres at $2 per acre	$ 5 08
Manure, one-fifth share of 6 tons per acre at $1 per ton	3 05
Seeding, man and 2 horses, 3 hours at 34 cents per hour	1 02
Binding, man and 3 horses, 3 hours at 41 cents per hour	1 23
Stooking, man, 6 hours at 19 cents per hour	1 14
Threshing, 220 bushels oats at 4 cents	8 80
Use of machinery, 2·54 acres at 60 cents per acre	1 52
Seed, 2·54 acres at $1 per acre	2 54
Twine	1 12
Total cost for 2·54 acres	$ 25 50

Total yield for 2·54 acres, 220 bushels.
Yield per acre, 86 bushels 21 pounds.
Cost per acre, $10.04.
Cost per bushel, 11½ cents.

BRANDON.

Cost of Producing Barley.

Barley after Corn.

Number of acres, 8½.

Preceding crops: Wheat, wheat, corn.

Items of cost:

Rent of land, 8½ acres at $2 per acre	$ 17 00
Manure, one-fifth share of 6 tons per acre at $1 per ton	10 20
Harrowing, man and 2 horses, 4 hours at 34 cents per hour	1 36
Seeding, man and 2 horses, 9 hours at 34 cents per hour	3 06
Packing, man and 4 horses, 4 hours at 48 cents per hour	1 92
Binding, man and 3 horses, 9 hours at 41 cents per hour	3 69
Stooking, man, 19 hours at 19 cents per hour	3 61
Threshing, 391 bushels of barley at 5 cents per bushel	19 55
Use of machinery, 8½ acres at 60 cents per acre	5 10
Seed, 8½ acres at $1 per acre	8 50
Twine	3 75
Total cost for 8½ acres	$ 77 74

Total yield for 8½ acres, 391 bushels.
Yield per acre, 46 bushels.
Cost per acre, $9.15.
Cost per bushel, 20 cents.

Barley after Wheat.

Number of acres, 6.

Preceding crops: Corn, wheat, wheat.

Items of cost:

Rent of land, 6 acres at $2 per acre	$ 12 00
Manure, one-sixth share of 8 tons per acre at $1 per ton	8 00
Ploughing in September, man and 4 horses, 20 hours at 48 cents per hour	9 60
Discing and harrowing in spring, man and 2 horses, 13½ hours at 34 cents per hour	4 59
Seeding, man and 2 horses, 7 hours at 34 cents per hour	2 38
Packing, man and 2 horses, 2½ hours at 34 cents per hour	85
Binding, man and 3 horses, 6½ hours at 41 cents per hour	2 66
Stooking, man, 10 hours at 19 cents per hour	1 90
Threshing, 323 bushels of barley at 5 cents per bushel	16 15
Use of machinery, 6 acres at 60 cents per acre	3 60
Seed, 6 acres at $1 per acre	6 00
Twine	3 00
Total cost for 6 acres	$ 70 73

Total yield for 6 acres, 323 bushels.
Yield per acre, 53 bushels 40 pounds.
Cost per acre, $11.79.
Cost per bushel, 22 cents.

Cost of Producing Flax.

Flax on Sod.

Number of acres, 4½.

Preceding crops: Oats, hay, pasture.

Items of cost:

Rent of land, 4½ acres at $2 per acre	$ 9 00
Manure, one-sixth share of 4 tons per acre at $1 per ton	3 00
Breaking, man and 2 horses, 48 hours at 34 cents per hour	16 32
Discing, man and 2 horses, 18 hours at 34 cents per hour	6 12
Backsetting, man and 4 horses, 22 hours at 48 cents per hour	10 56
Harrowing, man and 2 horses, 4½ hours at 34 cents per hour	1 53
Seeding, man and 2 horses, 3½ hours at 34 cents per hour	1 19
Binding, man and 3 horses, 8 hours at 41 cents per hour	3 28
Stooking, man, 10 hours at 19 cents per hour	1 90
Threshing, 62 bushels flax at 12 cents per bushel	7 44
Use of machinery, 4½ acres at 60 cents per acre	2 70
Seed, 4½ acres at $1 per acre	4 50
Twine	1 00
Total cost for 4½ acres	$ 68 54

Total yield for 4½ acres, 62 bushels.
Yield per acre, 13 bushels 44 pounds.
Cost per acre, $15.23.
Cost per bushel, $1.10½.

Brandon.

Cost of Producing Ensilage Corn.

This has been the most unfavourable season for corn since it has been grown in Manitoba. The cost per ton is therefore unduly high on account of low yield. Nevertheless, the following figures show that the corn did not cost much more than its value even this year.

Corn after Wheat.

Number of acres, 8½.
Preceding crops: Barley, hay, wheat, wheat.
Items of cost:

Rent of land, 8½ acres at $2 per acre	$ 17 00
Manure, one-fifth share of 6 tons per acre at $1 per ton	10 20
Ploughing in September, man and 4 horses, 25 hours at 48 cents per hour	12 00
Discing, harrowing and rolling, man and 2 horses, 37 hours at 34 cents per hour	12 58
Seeding, man and 2 horses, 13½ hours at 34 cents per hour	4 59
Cultivating, man and 2 horses, 33 hours at 34 cents per hour	11 22
Hoeing, man, 90 hours at 19 cents per hour	17 10
Binding, man and 3 horses, 7½ hours at 41 cents per hour	3 07
Ensiloing, 38 tons 1,144 pounds corn at 50 cents per ton	19 29
Use of machinery, 8½ acres at 60 cents per acre	5 10
Seed	6 07
Twine	2 50
Total cost for 8½ acres	$12 72

Total yield for 8½ acres, 38 tons 1,144 pounds.
Yield per acre, 4 tons 1,076 pounds.
Cost per acre, $14.20.
Cost per ton, $3.13.

ROTATION OF CROPS.

It is apparent to all observers of agricultural conditions in Western Canada, that the system of growing grain exclusively, which has been the main feature of our farming in the past, must be balanced with other crops, before a permanent system of agriculture is attained. The increase of weeds, the increase of soil blowing and general tendency to lessen crop yields are indications of the need of a change. One of the most important features in a permanent system of agriculture in any country and one that will need to be used as a factor in establishing such a system in Manitoba, is rotation of crops. In order to have some definite information as to what rotations might be advocated for Manitoba, a number of rotations have been tried on this Farm for several years.

In order that the results obtained in various years may be comparable, fixed valuations have been established upon which to calculate them. These valuations will be used from year to year, regardless of fluctations in rates of wages and values of products. Thus, in some seasons the actual profits will really be greater than are shown; in others, when prices for products are low, the profits will be less. These constant values, however, permit of a fairer comparison of the different rotations, and of periods of years within a single rotation.

The following values have been fixed for all the Prairie Farms and Stations:—

RETURN VALUES.

Wheat (from the machine)	per bushel.	$ 80
Barley " "	"	48
Oats " "	"	34
Peas " "	"	90
Flax " "	"	1 68
Timothy hay	per ton.	10 00
Red clover hay	"	10 00
Alfalfa hay	"	12 00
Brome grass hay	"	10 00
Western rye grass hay	"	10 00
Mixed hay	"	10 00
Green hay	"	10 00
Oat straw	"	2 00
Barley straw	"	2 00
Wheat straw	"	1 00
Pea straw	"	2 00
Flax straw	"	2 00
Dry corn stalks	"	5 00
Corn ensilage	"	3 00
Mangels and turnips	"	3 00
Sugar beets	"	4 00
Pasture, each horse	per month.	1 00
" " cow	"	1 00
" " sheep	"	25

COST VALUES.

Rent	per acre.	$ 2 00
Barnyard manure spread on fields (charged equally over all years of the rotation)	per ton.	1 00
Seed wheat	per acre.	1 50
Seed oats	"	1 00
Seed barley	"	1 00
(All other seeds to be charged at actual cost. Cost of grass seed to be charged equally on the years producing grass. Twine charged at actual cost.)		
Machinery	per acre.	60
Manual labour	per hour.	19
Horse labour (including teamster)—		
Single horse	per hour.	27
Two-horse team	"	34
Three-horse team	"	41
Four-horse team	"	48
Additional horses	each hour.	07
(Work done by traction engine is to be converted into the amount of horse labour required to do the work, and charged accordingly.)		
Threshing (covering work from stook to granary)—		
Wheat	per bush.	07
Oats	"	04
Barley	"	05
Flax	"	12
Peas	"	07

ROTATIONS.

The following are the rotations under test at Brandon, together with brief descriptions as to the mode of operation, the proportion of various crops provided and the type of farming to which each rotation is adapted. Following these descriptions will be found tables giving detailed results for 1915 from each rotation and some averages obtained.

ROTATION "D" (FOUR YEARS' DURATION).

First year.—Wheat.

Second year.—Wheat. Manured preceding fall.

Third year.—Oats.

Fourth year.—Summer-fallow.

Four fields of 3½ acres each are used for this rotation. The soil varies from a sandy to a clayey loam. This is purely a grain-growing rotation except that manure is applied every four years. Half the land is in wheat all the time, and one-quarter in oats, the other quarter being fallowed. The first crop of wheat is sown on summer-fallowed land. After the crop is harvested the land is manured in the fall and then ploughed. A second crop of wheat is then sown. The stubble is ploughed in the fall, if possible, and a crop of oats is grown the following year. The land is summer-fallowed in the fourth year, in preparation for wheat again. Operations were commenced on this rotation in 1910, and it has been in full operation ever since.

ROTATION "E" (FOUR YEARS' DURATION).

First year.—Wheat.

Second year.—Wheat.

Third year.—Oats.

Fourth year.—Summer-fallow.

The area under this rotation consists of four fields, 3½ acres each, lying contiguous to the corresponding fields of "D." The soil varies from a sandy loam to a clay loam. This is identically the same rotation as "D" except that no manure is applied at any time. This rotation is the most commonly used in Manitoba at the present time, being in use on a majority of the best-handled straight-grain farms. The proportion of crop is the same as "D," and, except for manure, the handling of the land is the same. It has been in operation the same length of time.

A result of rotations "D" and "E" that has shown itself quite strikingly already, is the difficulty in keeping wild oats in check. The three crops of grain in succession give this weed too great an opportunity to multiply, and the one year's summer-fallow is not entirely effective in killing it out. This result accords with the general experience through Manitoba, which has shown the impossibility of controlling wild oats under a straight grain-growing system, no matter how careful the cultivation.

ROTATION "F" (FIVE YEARS' DURATION).

First year.—Wheat.

Second year.—Wheat.

Third year.—Corn or roots. Manured preceding fall.

Fourth year.—Oats or barley. Seeded with grass and clover.

Fifth year.—Clover hay.

Five fields of 8½ acres each are used for this rotation. The soil is a black loam, mostly heavy, but with a lighter ridge running across each field. This is a mixed-farming rotation suited to conditions where it is desired to grow both a large quantity of wheat and a large amount of fodder for stock. It allows two-fifths of the land for wheat and one-fifth each for coarse grains, hay, and fodder corn. It makes no provision for pasture, pre-supposing enough pasture land on the farm outside the rotation. It eliminates the summer-fallow, using corn and clover as substitutes.

The first year, wheat is sown on the clover sod of the former fifth year. After the wheat is taken off, the land is fall ploughed. Wheat is sown again the second year. The land is then manured in the fall, and either fall or spring ploughed. The third year, corn is planted, and the land is kept clean by frequent intertillage. Barley or oats is sown the fourth year on the corn stubble, without ploughing. Along with the barley or oats is sown a mixture of 3 pounds of timothy, 5 pounds of western rye grass, and 8 pounds of red clover per acre. The fifth year, a crop of hay, largely clover, is harvested. As soon as the hay is off, the land is ploughed, and worked up for the wheat of the first year again.

This rotation has given very satisfactory results. While the corn and hay do not give great profits in themselves, they obviate the necessity of the idle year of the summer-fallow, and they are followed by unusually profitable grain crops. This rotation has given an average profit per acre of $8.96 for the past five years, as opposed to $6.39 per acre from rotation "E," the standard grain-growing rotation.

ROTATION "G" (SIX YEARS' DURATION).

First year.—Wheat.

Second year.—Wheat.

Third year.—Oats and barley. Seeded with grass and clover.

Fourth year.—Clover hay.

Fifth year.—Pasture.

Sixth year.—Corn or roots. Manured preceding fall.

Six fields of 6 acres each are allotted to rotation "G." The land is a heavy clay loam. This is a mixed-farming rotation which provides for one-third of the farm in wheat and, in addition, gives a good area to different kinds of feed for live stock, including pasture. The latter necessitates the building of divisional fences between the fields.

The wheat of the first year is sown among the stubble of the corn of the sixth year, without ploughing. The trash from the corn is raked off and burned, and the land harrowed. After the first crop of wheat is harvested, the land is fall ploughed for the second crop. After the second crop, it is again fall ploughed. The third crop is oats or barley, and with it is sown a mixture of 5 pounds of timothy and 8 pounds of red clover per acre. The fourth year, there is a crop of hay, mostly clover. As soon as it is removed, the aftermath is used for pasture. The fifth year is pasture, up till about the

middle of July or first of August, when the aftermath of the hay-field is ready to carry the stock. The pasture is then manured and ploughed under. There having been only two years of grass, the sod is not very hard to plough, and does not need to be backset. The sixth year is corn or roots. These are thoroughly cultivated, so that the land is left as clean as a good summer-fallow, and is ready for wheat again, without ploughing.

This rotation has also given very good results, much similar to those from rotation "F." Of the four original rotations "D," "E," "F," and "G," which have been in operation for over five years, this one has given the largest average profits per acre. The average profit per acre for five years has been $9.68, as compared with $6.39 on rotation "E," the standard grain-growing rotation.

ROTATION "H" (SIX YEARS' DURATION).

First year.—Wheat.

Second year.—Wheat.

Third year.—Summer fallow.

Fourth year.—Oats. Seeded with grass and clover.

Fifth year.—Hay.

Sixth year.—Pasture. Manured.

Six fields of 4½ acres each comprise the land on which rotation "H" is located It is heavy clay loam.

This rotation is suitable for a farm where grain growing is still the principal crop, but where hay and pasture are desired for stock. It includes one summer-fallow, and has no hoed crop. It is therefore suited to the farmer who considers a hoed crop impracticable under present labour conditions. It allows one-third of the land for wheat, one-sixth each for oats, hay and pasture. It has been in operation in the present form only since 1912.

The wheat of the first year is sown on sod land manured and broken the previous summer. After this crop is taken off, the land is fall ploughed and wheat is grown a second year. Then the land is summer-fallowed. Oats are sown on the summer-fallow and, along with them, grass and clover. Hay is cut the next year, and the aftermath pastured. The last year the land is pastured till midsummer, then broken up and prepared for wheat again.

This rotation is handicapped by being located on land that has been infested for many years with couch grass. This pest is now more under control, but it increases the cost of operation.

ROTATION "I" (SIX YEARS' DURATION).

First year.—Flax.

Second year.—Oats.

Third year.—Summer fallow.

Fourth year.—Wheat. Seeded with grass and clover.

Fifth year.—Hay.

Sixth year.—Pasture. Manured.

Six fields of 4½ acres provide the land required for this rotation. These fields lie contiguous to the corresponding fields of rotation "H," and are of the same character. Rotation "I" is suited to conditions such as described for "H." The chief differences

between the two rotations are that flax in "I" is substituted for wheat in "H," and wheat replaces oats after the summer-fallow.

The method of operation is the same as for "H" except for the difference in grain crops sown. The same handicap in regard to couch grass affects this rotation.

ROTATION "Q" (EIGHT YEARS' DURATION).

First year.—Roots and peas.

Second year.—Wheat or oats. Seeded with grass and clover.

Third year.—Hay.

Fourth year.—Hay.

Fifth year.—Pasture.

Sixth year.—Pasture.

Seventh year.—Pasture.

Eighth year.—Green feed and rape. Manured in fall.

This rotation is located on 40 acres of poor, gravelly soil, on the high land, at the rear of the Experimental Farm. It is used as a sheep farm, and the rotation is arranged accordingly. The first year is divided between peas and turnips. They are sown on land that grew green feed and rape the year before, and was manured and fall ploughed. The next year, the field is seeded down, with oats or wheat as a nurse crop. Two years of hay and three of pasture follow. In the last year of pasture, the land is ploughed in midsummer, and backset the following spring. A crop of green feed (peas and oats), and a crop of rape for pasture, are grown the last year. The land is then manured, and ploughed for the first-year crops again.

This rotation has not been much of a success so far. It probably does not make enough provision for conservation of moisture in this light land. It is proposed, after this rotation has had a little longer trial, to change to another to see if better results cannot be secured. Results from this rotation should not be compared with those obtained from the others, all of which are located on rich land.

ROTATION "W" (TEN YEARS' DURATION).

First year.—Wheat.

Second year.—Wheat.

Third year.—Corn or roots. Manured.

Fourth year.—Oats.

Fifth year.—Barley.

Sixth year.—Alfalfa. Seeded without nurse crop.

Seventh year.—Alfalfa.

Eighth year.—Alfalfa.

Ninth year.—Alfalfa.

Tenth year.—Alfalfa. Ploughed up in midsummer.

Ten fields of varying size from 1·4 acres to 2·9 acres are used for this rotation. The soil is a heavy clay loam.

This rotation is suited to a dairy or pure-bred stock farm where the chief object in crop-growing is the production of a large quantity of good fodder. At the same

time it allows for one-fifth of the land in wheat. Alfalfa is the chief crop of the rotation, and it has to be of long duration on that account. The first-year wheat is sown on land that grew alfalfa for four years and was ploughed in midsummer after the first cutting of the last year of alfalfa was taken off. After fall ploughing, another crop of wheat is taken off. The land is manured, and sown to corn or roots. Following the hoed crop, oats are sown, without ploughing. Following the oats, a crop of early-maturing barley is grown, and the land given a partial summer-fallow, either before the barley is sown or after it comes off. The next year, alfalfa is sown without a nurse crop. Three full years of alfalfa hay, and a first cutting of the fourth year, are harvested. The land is then ploughed in midsummer, and made ready for wheat again.

For the first time for many years there was some winter-killing of alfalfa in the winter of 1914-15. The alfalfa on this rotation was the only piece on the Farm that was affected. As a result, no crop of alfalfa was harvested in 1915, and poor returns are therefore shown. In 1914 the profit from this rotation was much the highest on the Farm.

The details of costs, returns, and profits on these rotations are given in the following tables:—

ROTATION

Rotation Year.	Crops. 1914.	Crops. 1915.	Area.	Items of Expense: Rent and manure.	Seed, twine and use of machinery.	Manual labour. Hours.	Manual labour. Cost.	Horse labour (including teamster). Hours. Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
			Ac.	$ c.	$ c.	No.	$ c.	No.	No.	No.	No.	No.
1st...	Fallow	Wheat	3·5	12 25	9 10	6	1 14	.....	3	4	1½	
2nd...	Wheat	Wheat	3·5	12 25	8 29	4½	85	...	14	3½	12	
3rd...	Wheat	Oats	3·5	12 25	5 85	3½	66	.....	16½	4	10½	
4th...	Oats	Fallow	3·5	12 25	2 10	...	...	...	13	.	28½	
	Aggregate		14	49 00	25 34	14	2 65	...	46½	11½	52½	
	Average per acre, 1915		....	3 50	1 81	1	19	...	3·3	·8	3·7	

ROTATION

1st...	Fallow	Wheat	3·5	7 00	8 97	6	1 14	.....	3	4	1½	...
2nd..	Wheat	Wheat	3·5	7 00	8 22	4½	85	.....	14	3½	12	...
3rd...	Wheat	Oats	3·5	7 00	5 85	3½	66	....	16½	4	10½	...
4th...	Oats	Fallow	3·5	7 00	2 10	.....	..	.....	13	..	28½	....
	Aggregate		14	28 00	25 14	14	2 65	...	46½	11½	52½	....
	Average per acre, 1915		.....	2 00	1 80	1	19	.....	3·3	·8	3·7	....

ROTATION

st....	Clover	Wheat	8·5	30 60	22 54	30	5 70	.....	31½	16	72	.....
2nd...	Wheat	Wheat	8·5	30 60	19 79	12	2 28	.....	19	9	32	.....
3rd ..	Wheat	Corn	8·5	27 20	13 6	90	17 10	.....	83½	7½	25	.....
4th...	Corn	Barley	8·5	27 20	17 35	19	3 61	.....	13	9	4	.....
5th...	Barley	Hay	8·5	30 60	25 13	6	1 14	.....	16	..	...	.....
	Aggregate		42·5	146 20	98 48	157	29 83	...	163	40·5	133	..
	Average per acre, 1915		.....	3 44	2 32	·37	70	.....	3·8	·95	3·1	.....

ROTATION

1st....	Corn	Wheat	6	20 00	16 72	24	4 56	.....	13	9½	25	.....
2nd...	Wheat	Wheat	6	20 00	15 60	13	2 47	.....	20½	7	21	.....
3rd...	Wheat	Barley	6	20 00	12 60	10	1 90	.....	23	6½	20	.....
4th...	Barley	Hay	6	20 00	10 47	20	3 80	.....	17½	.....	.....	.....
5th...	Hay	Pasture	6	20 00	7 98	3	57	....	10	.....	.....	.....
6th...	Pasture	Corn	6	18 00	9 69	80	15 20	..	84	10	23½	.....
	Aggregate		36	118 00	73 06	150	28 50	.	168	33	89·5	....
	Average per acre, 1915		.....	3 28	2 03	4·2	79	...	4·7	·9	2·5	.....

"D." (Four years' duration.)

in raising Crop.							Particulars of Crop.						
							Weight.						
Value of horse labour.	Cost of threshing or silo filling.	Total cost.	Cost of 1 acre.	Cost for 1 bushel.	Cost for 1 ton.	Value of pasture.	Grain.	Straw.	Hay.	Hoed crop.	Total value.	Value of crop per acre.	Profit or loss per acre.
$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	Lb.	Lb.	Lb.	Lb.	$ c.	$ c.	$ c.
3 38	9 31	35 18	10 05	0 46	.....	.....	7,980	14,000	.....	.....	113 40	32 40	22 35
11 95	7 00	40 34	11 53	0 40	.....	.....	6,000	7,500	.....	.....	83 75	23 93	12 40
12 29	4 96	36 01	10 29	0 29	.....	.....	4,216	6,000	.....	.....	48 16	13 76	3 47
18 10	...	32 45	9 27	.....	.....	.....	..	.....	.....	.....	.....	...	- 9 27
45 72	21 27	143 98	.....	.....	.....	.....	.....	.....	.....	.....	245 31	..	...
3 26	1 52	.....	10 29	.....	.....	.....	.....	.....	.....	.....	.....	17 52	7 23

"E." (Four years' duration.)

3 38	8 40	28 89	8 26	0 42	.....	.....	7,200	13,000	.....	.....	102 50	29 29	21 03
11 95	6 44	34 46	9 85	0 37½	.....	.....	5,520	7,000	.....	.....	77 10	22 03	12 18
12 29	4 88	30 68	8 77	0 25	.....	.....	4,148	6,000	.....	.....	47 48	13 57	4 80
18 10	...	27 20	7 77	...	.....	.....	.....	.....	.....	.....	.....	...	- 7 77
45 72	19 72	121 23	.....	.....	.....	.....	.....	.....	.....	.....	227 08	.....	.....
3 26	1 41	.....	8 66	.....	.....	.....	.....	.....	.....	.....	.....	16 22	7 56

"F." (Five years' duration.)

51 83	23 52	134 19	15 79	0 40	.....	.....	20,160	37,500	.....	.....	287 55	33 83	18 04
25 51	15 26	93 44	10 99	0 43	.....	.....	13,080	15,500	.....	.....	182 15	21 43	10 44
43 46	19 29	120 72	14 20	...	3 13	.....	.....	.....	.....	77,144	115 72	13 61	- 59
10 03	19 55	77 74	9 15	0 20	.....	.....	18,768	30,000	.....	.....	217 68	25 61	16 46
5 44	....	62 31	.....	.....	12 17	.....	.....	.....	10,240	.....	51 20	6 02	- 1 31
136 27	77 62	488 40	.....	.....	.....	.....	.....	.....	.....	.....	854 30	.....	.....
3 21	1 82	.....	11 49	.....	.....	.....	.....	.....	.....	.....	.....	20 10	8 61

"G." (Six years' duration.)

20 31	16 80	78 39	13 06	0 32½	....	.....	14,400	33,000	.....	.....	208 50	34 75	21 69
19 92	12 88	70 87	11 81	0 38½	...	...	11,040	24,000	.....	.....	159 20	26 53	14 72
20 08	16 15	70 73	11 79	0 22	....	.....	15,504	24,000	.....	.....	179 04	29 84	18 05
5 95	....	40 22	6 70	.....	6 12	10 00	.....	.....	13,150	.....	75 75	12 62	5 92
3 40	...	31 95	5 32	.....	....	46 65	.....	.....	.....	...	46 65	7 77	2 45
43 94	16 05	102 88	17 15	.....	3 26	..	.....	.....	.....	64,184	96 28	16 05	- 1 10
113 60	61 88	395 04	.....	.....	.....	....	.....	.....	.....	.....	765 42	...	.....
3 16	1 72	.....	10 97	.....	.....	....	.....	.....	.....	.....	..	21 26	10 29

ROTATION

Rotation Year.	Crops.		Area.	Items of Expense								
				Rent and manure.	Seed, twine and use of machinery.	Manual labour.		Horse labour (including teamster).				
								Hours.				
						Hours.	Cost.	Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
	1914.	1915.	Ac.	$ c.	$ c.	No.	$ c.	No.	No.	No.	No.	No.
1st	Pasture	Wheat	4·5	12 00	10 95	10	1 90		74	5		
2nd	Wheat	Wheat	4·5	13 50	10 79	7	1 33		18	4½	13½	
3rd	Wheat	Fallow	4·5	13 50	2 70				37		36	
4th	Fallow	Oats	4·5	13 50	9 82	22	4 18		9½	10½		
5th	Oats	Hay	4·5	9 00	10 53	6	1 14		12½			
6th	Hay	Pasture	4·5	9 00	6 75				4			
	Aggregate		27	70 50	51 54	45	8 55		155	20	49·5	
	Average per acre, 1915			2 61	1 91	1·8	32		5·1	·7	1·8	

ROTATION

1st	Pasture	Flax	4·5	12 00	8 20	10	1 90		74	8	22	
2nd	Flax	Oats	4·5	13 50	8 26	7	1 33		18	4½	13½	
3rd	Oats	Fallow	4·5	13 50	2 70				37		36	
4th	Fallow	Wheat	4·5	13 50	12 45	17	3 23		9½	6½		
5th	Wheat	Hay	4·5	9 00	10 53	6	1 14		12½			
6th	Hay	Pasture	4·5	9 00	6 75				4			
	Aggregate		27	70 50	48 89	40	7 60		155	19	71·5	
	Average per acre, 1915			2 61	1 81	1·5	28		5·1	·7	2·7	

ROTATION

1st	Oats and rape	Turnips	5	10 00	12 00	350	66 50	20	23		18½	
2nd	Turnips	Oats	5	20 00	9 00	5	95		17	10		
3rd	Oats	Hay	5	20 00	6 15	8	1 52		16			
4th	Hay	Hay	5	20 00	7 54	10	1 90		15			
5th	Hay	Pasture	5	10 00	3 98							
6th	Pasture	Pasture	5	10 00								
7th	Pasture	Pasture	5	10 00								
8th	Pasture	Oats and rape	5	10 00	9 50	9	1 71		86½	6	25½	
	Aggregate		40	110 00	48 17	328	72 58	20	157·5	16	44	
	Average per acre, 1915			2 75	1 20	9·5	1 81	·5	3·9	·4	1·1	

"H." (Six years' duration.)

in raising Crop.							Particulars of Crop.						
							Weight.						
Value of horse labour.	Cost of threshing or silo filling.	Total cost.	Cost of 1 acre.	Cost for 1 bushel.	Cost for 1 ton.	Value of pasture.	Grain.	Straw.	Hay.	Hoed crop.	Total value.	Value of crop per acre.	Profit or loss per acre.
$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	Lb.	Lb.	Lb.	Lb.	$ c.	$ c.	$ c.
27 21	8 19	60 25	13 39	0 51½	.....	.....	7,020	12,000	....	.....	99 60	22 13	8 74
14 44	9 17	49 23	10 94	0 37½	.....	.....	7,860	10,500	....	.....	110 05	24 46	13 52
29 86	.....	46 06	10 24	.....	.....	.....	.....	.....	.....	.....	.....	.....	-10 24
7 53	14 88	49 91	11 09	0 24	.....	.....	12,648	21,000	.....	.....	147 48	32 77	21 68
4 25	.....	24 92	5 54	.....	6 23	8 00	.....	.....	8,000	.....	48 00	10 67	5 13
1 36	.....	17 11	3 80	.....	.....	30 00	.....	.....	.....	.....	30 00	6 67	2 87
84 65	32 24	247 48	.....	.....	.....	.....	.....	.....	.....	.....	435 13	.....	.....
3 14	1 19	.....	9 17	.....	.....	.....	.....	.....	.....	.....	.....	16 12	6 95

"J." (Six years' duration.)

39 00	7 44	68 54	15 23	1 10½	.....	.....	3,472	8,000	.....	.....	112 16	24 92	9 69
14 44	7 96	45 49	10 11	0 23	.....	.....	6,766	8,500	.....	.....	76 16	16 92	6 81
29 86	.....	46 06	10 23	.....	.....	.....	.....	.....	.....	.....	.....	.....	10 23
5 89	10 15	45 22	10 05	0 60	.....	.....	8,700	24,000	.....	.....	128 00	28 44	18 39
4 25	.....	24 92	5 54	.....	6 23	8 00	.....	.....	8,000	.....	48 00	10 67	5 13
1 36	.....	17 11	3 80	.....	.....	30 00	.....	.....	.....	.....	30 00	6 67	2 87
94 80	25 55	247 34	.....	.....	.....	.....	.....	.....	.....	.....	394 32	.....	.....
3 51	0 95	.....	9 16	.....	.....	.....	.....	.....	.....	.....	.....	14 60	5 44

"O." (Eight years' duration.)

22 10	.....	110 60	22 12	.....	.....	.....	.....	.....	.....	.....	20 25	4 05	-18 07
9 88	11 44	51 27	10 25	.....	.....	.....	9,724	8,000	.....	.....	105 24	21 05	10 80
5 44	.....	33 11	6 62	.....	7 79	.....	.....	.....	8,495	.....	42 47	8 49	1 87
5 10	.....	34 54	6 91	.....	5 97	.....	.....	.....	11,570	.....	57 85	11 57	4 66
.....	.....	13 98	2 80	.....	.....	26 25	.....	.....	.....	.....	26 25	5 25	2 45
.....	.....	10 00	2 00	.....	.....	15 00	.....	.....	.....	.....	15 00	3 00	1 00
.....	.....	10 00	2 00	.....	.....	15 00	.....	.....	.....	.....	15 00	3 00	1 00
44 41	8 16	73 48	14 70	.....	.....	15 50	6,936	8,000	.....	.....	84 86	16 97	2 27
86 63	19 60	336 98	.....	.....	.....	.....	.....	.....	.....	.....	366 92	.....	.....
2 16	0 49	.....	8 42	.....	.....	.....	.....	.....	.....	.....	.....	9 17	0 75

ROTATION

Rotation Year.	Crops.		Area.	Items of Expense								
				Rent and manure.	Seed, twine and use of machinery.	Manual labour.		Horse labour (including teamster).				
								Hours.				
						Hours.	Cost.	Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
	1914.	1915.	Ac.	$ c.	$ c.	No.	$ c.	No.	No.	No.	No.	No.
1st	Alfalfa	Wheat	1·4	2 80	3 88	4½	85	.....	15	2½	13½	.....
2nd	Wheat	Wheat	1·73	3 46	4 27	4	76	.....	3½	3½	6	.....
3rd	Wheat	Corn	2·1	6 72	3 71	25	4 75	.....	25½	6	2½	.....
4th	Corn	Oats	2·54	8 13	5 18	6	1 14	.....	3	3	.....	.....
5th	Oats	Barley	2·72	5 44	5 10	5	95	.....	9½	3½	10	.....
6th	Barley	Alfalfa (new seeding)	2·9	5 80	1 74	.....	.....	.....	19	.....	22	.....
7th	Alfalfa	Alfalfa (winter killed and reseeded)	1·87	3 74	1 12	.....	.....	.....	11½	.....	12½	.....
8th	Alfalfa	Alfalfa (winter killed and reseeded)	2·4	4 80	1 44	.....	.....	.....	15½	.....	18½	.....
9th	Alfalfa	Alfalfa (winter killed and reseeded).	2·16	4 32	1 29	.....	.....	.....	13½	.....	15½	.....
10th	Alfalfa	Alfalfa (winter killed and fallowed)	1·55	3 10	93	.....	.....	.....	5	.....	30	.....
	Aggregate		21·37	48 31	27 66	44·5	8 45	.....	121	18·5	130·5	.....
	Average per acre, 1915		.....	2 26	1 29	2·08	39	.....	5·6	·86	6·1	.....

SESSIONAL PAPER No. 16

"W." (Ten years' duration.)

in raising Crop.							Particulars of Crop.						
							Weight.						
Value of horse labour.	Cost of threshing or silo filling.	Total cost.	Cost of 1 acre.	Cost for 1 bushel.	Cost for 1 ton.	Value of pasture.	Grain.	Straw.	Hay.	Hoed crop.	Total value.	Value of crop per acre.	Profit or loss per acre.
$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	Lb.	Lb.	Lb.	Lb.	$ c.	$ c.	$ c.
12 60	4 62	24 75	17 68	0 37½	.....	.....	3,960	7,500	.....	.....	56 55	40 39	22 71
5 50	3 71	17 70	10 23	0 33½	.....	.....	3,180	5,000	.....	.....	44 90	25 95	15 72
12 33	5 69	33 20	15 81	..	2 92	.....	.....	.....	.....	22,760	34 14	16 26	0 45
2 27	8 80	25 50	10 04	0 11½	.....	.....	7,480	9,000	.....	.....	83 80	32 99	22 95
9 46	5 80	26 75	9 84	0 23	.....	.....	5,568	6,000	.....	.....	61 68	22 68	12 84
17 02	.....	24 56	8 47	.....	.....	.....	.....	.....	.....	.....	.....	.....	– 8 47
9 91	.....	14 77	7 90	.....	.....	.....	.....	.....	.....	.....	.....	.....	– 7 90
14 15	.....	20 39	8 50	.....	.....	.....	.....	.....	.....	.....	.....	.....	– 8 50
12 03	.....	17 64	8 17	.....	.....	.....	.....	.....	.....	.....	.....	.....	– 8 17
16 10	.....	20 13	12 99	.....	.....	.....	.....	.....	.....	.....	.....	.....	–12 99
111 35	29 62	225 39	.....	.....	.....	.....	.....	.....	.....	.....	281 07	.....	.....
5 21	1 39	.....	10 55	.....	.....	.....	.....	.....	.....	.....	.....	13 15	2 60

CULTURAL EXPERIMENTS.

In presenting the following report of the cultural experiments, I wish to give credit to my assistant, Mr. W. H. Hicks, who has had the immediate supervision of the work during the past season, and who has compiled the results presented herewith.

The extensive plan of cultural experiments commenced on this Farm in 1911 has been continued during another season. The purpose of these experiments is to gain some information as to the methods of cultivation likely to give the best results along the line of moisture conservation, soil fertility conservation, weed eradication, and forage crop production. This investigational work is carried on on a fairly uniform block of land, which is divided into 463 plots, each one-fortieth of an acre in size. A change was made this year in the method of sowing these plots. Previously each plot was sown by itself and was surrounded by cultivated ground, a 4-foot strip on the side and a 20-foot road on the end. This year the 4-foot strips between the plots were sown and also a strip 2-feet wide along the roads. This made a neutral strip of grain of the same kind as the plot around each plot. By this means it was hoped to remove the influence of the perpetual summer-fallow in the paths and roads around the plots, and thus to lessen the experimental error.

Seeding commenced on April 12, and on account of the dry spring, the soil was in excellent condition for this operation. From that time till threshing was completed on September 4, the weather conditions were as favourable for this work as could be expected. Whether these experiments will prove adequate in the solution of the problems outlined below, remains to be seen after a few more years' work has been carried on and the totals averaged up.

DEPTH OF PLOUGHING.

In this experiment, the various depths indicated in the table refer to the ploughing of the summer-fallow. Wheat is sown on this land and followed by oats. The fall ploughing of the wheat stubble is the same depth as that of the summer-fallow, where the latter is 5 inches or less, but where the summer-fallow ploughing is more than 5 inches the stubble ploughing that follows is uniformly 5 inches deep. The other treatment given is uniform for each plot of the same crop.

Plot No.	Depth of ploughing summer-fallow.	Yield of Wheat after summer-fallow.		Yield of Oats second season after summer-fallow.	
		1915.	4-year average.	1915.	3-year average.
		Bush. Lb.	Bush. Lb.	Bush. Lb.	Bush. Lb.
1	Ploughing 3 inches deep	58 20	52 27	80 10	89 14
2	Ploughing 4 inches deep	56 00	51 52	80 30	89 14
3	Ploughing 5 inches deep	59 10	50 35	84 04	91 13
4	Ploughing 6 inches deep	54 10	49 38	90 00	94 01
5	Ploughing 7 inches deep	57 40	50 17	74 24	88 18
6	Ploughing 8 inches deep	60 40	52 55	92 22	92 29
7	Ploughing 5 inches deep, subsoil 4 inches	59 20	48 5	91 16	95 27
8	Ploughing 6 inches deep, subsoil 4 inches	64 40	49 32	100 00	99 14
9	Ploughing 7 inches deep, subsoil 4 inches	57 20	49 22	95 20	95 7
10	Ploughing 8 inches deep, subsoil 4 inches	56 20	46 18	105 30	97 09

Wheat plots 9 and 10 ripened August 15, while all the other wheat plots ripened one day later. Oat plots 1 to 3 ripened August 11; plots 4 and 6, August 10; and plots

7 to 10, August 12. Depth of ploughing did not appear to have much influence on time of ripening.

The yields obtained from this experiment are not indicative of any rule to follow regarding depth of ploughing. The subsoiling has lowered the yields of wheat on summer-fallow, but the following crop of oats has given greater results than where no subsoiling was done.

DEPTH OF PLOUGHING SOD.

This experiment is to try different depths of ploughing sod of tame grasses and clover. The sod used is a mixture of timothy, western rye grass, red clover, and alfalfa. The ploughing is done in mid-summer as soon as the hay is harvested. The next spring, wheat is sown. After the wheat is harvested, the land is ploughed according to the depths specified, and the next year, oats are grown.

Plot No.	Treatment.	Yield of Wheat on sod.		Yield of Oats after wheat.	
		1915.	2-year aver.	1915.	2-year aver.
		Bush. Lb.	Bush. Lb.	Bush. Lb.	Bush. Lb.
11	Ploughing 3 inches deep, sod and stubble	60 00	49 10	80 00	79 9
12	Ploughing 4 inches deep, sod and stubble	55 50	50 5	74 24	78 33
13	Ploughing 5 inches deep, sod and stubble	60 50	53 55	75 30	80 30
14	Ploughing sod 3 inches deep, and stubble 6 inches deep	57 00	49 55	69 4	79 14

The 5-inch ploughing of sod appears to have a slight advantage over the shallower ploughing, but the difference is not very decided.

TREATMENT OF SUMMER-FALLOW.

In this experiment, the summer-fallow receives the treatment specified below, with sufficient additional uniform cultivation to keep down the weeds. Wheat is sown on the summer-fallow, and the following year oats are grown to test the lasting effect of the different methods of summer-fallowing.

In order to present the results more clearly, they are reported in groups.

PLOUGHING Once *versus* Twice.

Plot No.	Treatment given.	Yield of Wheat on summer-fallow.				Yield of Oats, second season.			
		1915.		4-year aver.		1915.		4-year aver.	
		Bush.	Lb.	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
1	Plough 4 inches June, pack if necessary and practicable, cultivate as necessary	57	40	43	8	74	14	73	24
2	Plough 6 inches June, pack if necessary and practicable, cultivate as necessary	55	40	47	12	68	18	75	32
3	Plough 8 inches June, pack if necessary and practicable, cultivate as necessary	57	20	47	52	67	22	76	3
4	Plough 4 inches June, cultivate. Plough 4 inches September, harrow	52	00	45	45	67	02	74	19
5	Plough 6 inches June, cultivate. Plough 6 inches September, harrow	53	40	46	47	70	00	76	13
6	Plough 8 inches June, cultivate. Plough 8 inches September, harrow	54	20	45	15	68	8	72	32
7	Plough 6 inches June, cultivate. Plough 4 inches September, harrow	57	30	47	45	72	32	77	02
8	Plough 4 inches June, cultivate. Plough 6 inches September, harrow	58	00	45	00	74	4	75	29
9	Plough 4 inches June, early as possible, cultivate. Plough 6 inches September, leave untouched	57	20	45	27	70	20	71	16
	Average of 3 plots ploughed once			46	4			75	8
	Average of 6 plots ploughed twice			46	00			74	26

The results here would indicate that one ploughing of the summer-fallow is at least equal to two ploughings, when the land gets the neeessary eultivation during the summer. The wheat grown on plots 1 to 3 had strong straw which stood up well during a heavy storm just before harvesting, while the grain on plots 4 to 9 was badly tangled and lodged. Another feature worth noting is that the average weight per measured bushel of the grain grown on plots 1 to 3 was 62⅔ pounds, while that grown on plots 4 to 9, was 60 pounds. The plots that were ploughed once were from one to three days earlier.

It will also be noticed that there is a gradual increase in yield on the first three plots as the depth of the ploughing is increased.

PASTURE *versus* Bare Fallow.

Plot No.	Treatment given.	Yield of Wheat on summer-fallow.				Yield of Oats following wheat.			
		1915.		4-year aver		1915.		4-year aver.	
		Bush.	Lb.	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
10	Plough 5 inches June, seed to rape or other green forage crop and pasture off	50	00	45	52	62	12	95	8
12	Plough 6 inches June 15, harrow and pack if necessary, cultivate as necessary	58	20	50	18	63	18	92	32

The wheat grown in 1915 on the plot which had grown rape the year before, was inferior to that grown on the plot that had been kept bare. The same results are indicated in the 4-year averages. The rape apparently consumes much of the moisture which the succeeding crop should get. The land after being pastured off is in a very hard condition, which makes it difficult to work into proper shape, and weeds are hard to overcome.

DATE of Ploughing Summer-Fallow.

Plot No.	Treatment given.	Yield of Wheat on summer-fallow.		Yield of Oats, second season.	
		1915.	4-year aver.	1915.	4-year aver.
		Bush. Lb.	Bush. Lb.	Bush. Lb.	Bush. Lb.
11	Plough 6 inches May 15, harrow and pack if necessary, cultivate as necessary	56 40	47 38	70 00	89 6
12	Plough 6 inches June 15, harrow and pack if necessary, cultivate as necessary	58 20	50 18	63 18	92 32
13	Plough 6 inches July 15, harrow and pack if necessary, cultivate as necessary	49 50	45 30	73 18	93 20

The effect of ploughing summer-fallow in May or June, as compared with July, was well demonstrated this year. The grain grown on the July-ploughed plot was much shorter in the head and straw, was thinner, and gave a much smaller yield than that grown on plots 11 and 12. The weeds on the July-ploughed plot had to be pulled to keep them from going to seed, but this was unnecessary on the May- and June-ploughed plots.

FALL Cultivation before Summer-Fallowing.

Plot No.	Treatment given.	Yield of Wheat.	
		1915.	4-year aver.
		Bush. Lb.	Bush. Lb.
12	Plough 6 inches June 15, harrow and pack if necessary, cultivate as necessary	58 20	59 18
14	Fall cultivate before summer-fallowing. Plough 6 inches June, harrow and pack if necessary, cultivate as necessary	56 20	47 20
15	Fall plough 4 inches before summer-fallowing. Plough 6 inches June, harrow and pack if necessary, cultivate as necessary	52 00	46 00

PACKING *versus* NO PACKING.

These two plots are used as a check on experiment 10, "Use of Soil Packers."

Plot No.	Treatment given.	Yield of Wheat.	
		1915.	4-year aver.
		Bush. Lb.	Bush. Lb.
16	Plough 6 inches June, pack, cultivate as necessary	49 30	48 52
17	Plough 6 inches June, no packing, otherwise same as plot 16	52 10	45 22

STUBBLE TREATMENT.

This experiment is for the purpose of determining the best method of handling stubble land that has produced one crop of wheat since summer-fallowing. Thirty-nine plots, arranged in three groups of thirteen each, are used. One group is uniformly summer-fallowed each year and sown to wheat. The next year this wheat stubble receives the treatment mentioned below.

WHEAT Stubble Land to be Sown to Wheat.

Plot No.	Treatment given.	Yield of Wheat.	
		1915.	4-year aver.
		Bush. Lb.	Bush. Lb.
1	Plough—autumn	28 20	30 30
2	Disc harrow—autumn	29 00	32 40
3	Burn stubble, then disc—autumn	33 20	33 55
4	Burn stubble, then plough—autumn	29 50	32 52
5	Burn stubble in spring, seed at once	36 20	35 17
6	Plough in spring, seed at once	36 10	35 45
7	Disc at cutting time, spring plough	27 20	31 40
8	Disc at cutting time, autumn plough	29 20	33 44
9	Plough autumn, subsurface pack at once	29 50	34 30
10	Plough spring, seed, subsurface pack	31 50	32 30

WHEAT Stubble Land to be Sown to Oats.

Plot No.	Treatment given.	Yield of Oats.	
		1915.	4-year aver.
		Bush. Lb.	Bush. Lb.
11	Plough autumn, subsurface pack at once	72 12	82 8
12	Plough spring, seed, subsurface pack	68 8	80 24
13	Cultivate autumn, spring plough, seed	80 20	89 6

It is not considered advisable to attempt to draw conclusions from these results.

BRANDON.

SEEDING TO GRASS AND CLOVER.

This experiment has, as its object, the determination of the best preparatory crops for seeding down with or without a nurse crop. The mixture used is 10 pounds of western rye grass and 10 pounds of red clover.

Plot No.	Treatment given.	Yield of Hay per acre.	
		1915.	3-year average.
		Tons. lb.	Tons. lb.
1	Seeding with nurse crop after summer-fallow	2 600	2 1,987
2	Seeding alone after summer-fallow	2 1,400	3 1,400
3	Seeding with nurse crop first year after hoed crop	1 1,600	2 200
4	Seeding alone after hoed crop	2 480	3 1,027
5	Seeding with nurse crop after first year wheat	1 760	2 587
6	Seeding alone after first year wheat	1 1,800	2 1,480
7	Seeding with oats to cut green after first year wheat	— 1,440	2 107
8	Seeding alone after first year wheat	.....	.....
	Manure, 8 tons per acre, ploughed in preceding fall	1 1,800	2 1,320
9	Seeding with nurse crop after second year wheat	1 40	2 267
10	Seeding alone after second year grain	1 1,560	2 613
11	Seeding with nurse crop after second year wheat following hoed crop	1 40	2 27
	Average of Plots 1, 3, 5, 9, seeded with nurse crop	.....	2 1,260
	Average of Plots 2, 4, 6, 10, seeded alone	.....	3 130

In every instance greater yields were procured where grass was sown alone than where sown with a nurse crop. In most instances, however, the increase of hay crop will hardly warrant dispensing with the nurse crop. This will depend largely on the amount of rainfall in the locality where the crops are grown.

Better results were obtained by seeding after summer-fallow and after hoed crops than after the land had grown one or two crops of grain since summer-fallowing.

BREAKING SOD FROM CULTIVATED GRASSES AND CLOVERS.

The sod for this experiment is obtained by seeding down 8 plots with the following mixture: 10 pounds western rye grass, 3 pounds alfalfa, and 3 pounds red clover, per acre, without a nurse crop. This land is then left in hay for two years, when the following methods of breaking the land are tested.

Plot No.	Treatment given.	Yield of crops in 1914.	Yield of Wheat in 1915 on plots receiving the treatment in 1914.	Total value of 2 years' crop.
			Bush. lb.	
1	Plough July 20 to 30, 5 inches deep; pack and disc at once, disc in fall	Hay... Lb. 5,430	47 40	$65 28
2	Plough in October, 5 inches deep, pack, disc harrow	Hay... 6,740	44 00	68 90
3	Plough early July, 3 inches deep, backset September, cultivate as necessary	Hay... 4,120	60 40	69 13
4	Stiff tooth rip July, plough 5 inches deep September, cultivate	Hay... 4,120	42 20	54 47
5	Spring plough 5 inches deep, seed same spring to wheat	Wheat. Bush. Lb. 32 50	35 20	54 53
6	Duplicate No. 5, sow flax	Flax. 10 00	35 40	45 33
7	Repeat No. 5, sow peas	Peas... 22 40	46 50	57 87
8	Plough May 15, work as summer-fallow	No crop.	74 40	59 73

In order to compare the net results of two seasons with different crops, the result is estimated on a basis of value. The following prices are allowed on the crops: Hay, $10 per ton; wheat, 80 cents per bushel; flax, $1.68 per bushel; peas, 90 cents per bushel.

No attempt is made to put a price on the different operations necessary in these methods of handling the land. There are so many factors influencing these that it is not thought advisable to do so.

The results obtained in this experiment indicate that it is more profitable to produce a crop of hay on the land and then break, than to break in the spring and get a grain crop, or to summer-fallow.

Plot 2 gave rather better results than were expected. This is probably due to plenty of moisture giving a good second crop of hay. In spite of these results it is not considered a good practice to leave breaking till October.

APPLICATION OF BARNYARD MANURE.

Several methods of applying barnyard manure for corn, wheat, barley and oats are tried in this experiment. Rotted manure is used except where otherwise stated; the amount being 12 tons per acre.

For Corn on Land which has Grown two Crops of Wheat.

Plot No.	Treatment given.	Yield of Corn per acre.	
		1915.	3-year aver.
		Tons. Lb.	Tons. Lb.
1	No manure, second year stubble, ploughed in autumn	7 1,080	9 535
2	Apply on surface in autumn after ploughing second year stubble, and work in at once	8 720	10 1,800
3	Apply in spring on surface of ploughed land, second year stubble and work in at once	10 240	10 1,675
4	Plough in autumn right after applying, second year stubble	9 1,280	12 465
5	Plough in spring right after applying, second year stubble	9 800	10 1,600
6	Winter apply, plough in spring, second year stubble	9 680	11 1,480
7	Winter apply, green manure (cut straw) on second year stubble, plough in spring	9 880	11 1,400

Plot 4 has given the best results in the 3-year averages and this method is considered good practice.

For Corn on Summer-Fallow.

Plot No.	Treatment given.	Yield of Corn per acre.	
		1915.	3-year aver.
		Tons. Lb.	Tons Lb.
8	Winter apply, green manure, disc in	12 1,160	14 65
9	No manure	10 1,880	13 400

Barnyard manure increases the yields of corn even where applied on summer-fallow.

Brandon.

For Wheat (Second Crop after Summer-Fallow).

Plot No.	Treatment given.	Yield of Wheat per acre.			
		1915.		4-year aver.	
		Bush.	Lb.	Bush.	Lb.
1	Apply in winter green manure, and disc in	27	40	32	44
3	Top dress with spreader after seeding	28	20	34	17
5	No manure	27	10	33	5
6	Apply in fall and plough in	31	50	34	20
7	Apply in spring, and plough in	33	00	39	42
8	No manure, stubble disced and not ploughed	30	40	33	30
9	No manure, stubble burned and then ploughed	29	40	31	30

The stubble land was fall ploughed 5 inches deep except plots 7 and 8. Plot 7 was ploughed in the spring while plot 8 was not ploughed at all.

For Wheat on Summer-Fallow.

Plot No.	Treatment given.	Yield of Wheat per acre.			
		1915.		4-year aver.	
		Bush.	Lb.	Bush.	Lb.
2	Apply in winter, green manure, disc in	50	40	47	42
4	Top dress with spreader, grain sown on summer fallow	55	40	48	12
5	No manure	51	00	45	00

For Barley (Second Crop after Summer-Fallow).

Plot No.	Treatment given.	Yield of Barley per acre.			
		1915.		4-year av. r.	
		Bush.	Lb.	Bush.	Lb.
1	Apply in winter, green manure, disc in	39	08	42	37
3	Top dress with spreader after seeding	47	44	53	09
5	No manure	48	46	54	33
6	Apply in fall and plough in	55	10	58	41
7	Apply in spring and plough in	49	08	55	17
8	No manure, stubble disced and not ploughed	41	12	48	43
9	No manure, stubble burned and then ploughed	60	20	54	08

Wheat was grown on all plots the preceding year. All plots were fall ploughed 5 inches deep except 7 and 8. Plot 7 was ploughed in the spring while plot 8 was not ploughed at all.

Brandon.

For Barley on Summer Fallow.

Plot No.	Treatment given.	Yield of Barley per acre.			
		1915.		4-year aver.	
		Bush.	Lb.	Bush.	Lb.
2	Apply in winter green manure; sow barley on summer-fallow	52	24	60	12
4	Top dress with spreader barley sown on summer fallow	50	20	65	10

For Oats (Second Crop After Summer Fallow).

Plot No.	Treatment given.	Yield of Oats per acre.			
		1915.		4-year aver.	
		Bush.	Lb.	Bush.	Lb.
1	Apply in winter, green manure, disc in	80	00	86	21
3	Top dress with spreader after seeding	77	2	89	1
5	No manure	72	12	87	15
6	Apply in fall and plough in	82	32	100	22
7	Apply in spring and plough in	77	12	98	15
8	No manure, stubble disced, not ploughed	72	32	92	7
9	No manure, stubble burned, then ploughed	59	14	84	26

Wheat was the preceding crop on all plots. All plots were fall ploughed 5 inches deep except 7 and 8. Plot 7 was ploughed in the spring while plot 8 was not ploughed at all.

For Oats on Summer Fallow.

Plot No.	Treatment given.	Yield of Oats per Acre.			
		1915.		4-year aver.	
		Bush.	Lb.	Bush.	Lb.
2	Apply in winter, green manure, on summer-fallow, sow oats on summer fallow	100	10	105	00
4	Top dress with spreader, grain sown on summer-fallow	91	6	95	2

GREEN MANURING.

This experiment compares the value of green manure with bare summer-fallow as a preparation for growing grain crops. The green manuring consists of growing crops of peas and tares and ploughing them under. One summer-fallow plot also has barnyard manure applied at the rate of 12 tons per acre. The first season after the treatment, wheat is sown on the plots, and the following season oats are sown.

Plot No.	Treatment given.	Yield of Wheat following treatment.		Yield of Oats, second season after treatment.	
		1915.	4-year aver.	1915.	3-year aver.
		Bush. Lb.	Bush. Lb.	Bush. Lb.	Bush. Lb.
1	Summer-fallow	60 40	50 8	71 26	91 26
2	Peas, two bushels Golden Vine (or other similar variety)	57 20	49 15	70 00	86 4
3	Peas, two bushels Golden Vine, ploughed under when in blossom	57 00	44 17	68 8	88 1
4	Tares, one bushel per acre, ploughed under late July	41 50	43 5	66 6	85 10
5	Summer fallow, barnyard manure, 12 tons per acre, applied on summer-fallow in September	58 00	52 35	62 22	88 00
6	Summer-fallow	61 00	50 45	71 16	89 29

The results of this experiment seem to indicate that green crops ploughed under are of little immediate benefit to the land as compared with bare fallow. The growing of the green crop seems to take the moisture from the soil which would otherwise be stored by the bare fallow. Tares seem to be more faulty in this respect than peas. Barnyard manure gave better results than green manure.

PREPARATION OF SEED-BED.

Three grades of seed-bed preparation are compared in this experiment, with wheat grown on summer-fallow and oats on fall ploughed stubble land.

WHEAT ON SUMMER-FALLOW.

The summer-fallowing for this experiment was done uniformly. The difference in preparation being in the spring cultivation. "Poor" got no spring cultivation, "Good" got one harrowing before seeding, "Extraordinary" got three harrowings, one before seeding and one after.

Plot No.	Treatment given.	Yield of Wheat per acre.	
		1915.	4-year aver.
		Bush. Lb.	Bush. Lb.
1	Poor preparation	60 10	46 38
2	Good preparntion	58 00	46 32
3	Extraordinary preparation	56 50	46 12

The results show that no spring cultivation is necessary where the summer-fallow has been well worked.

BRANDON.

OATS ON FALL PLOUGHING.

The fall ploughing on all plots is done as uniformly as possible, the different treatment being applied in the spring. "Poor" got no spring cultivation, "Good" got one stroke of the harrow before seeding, "Extraordinary" got one stroke of the harrow before seeding and two afterwards. These treatments may appear to be not enough to merit the description, but the land was mellow and required very little work.

Plot No.	Treatment given.	Yield of Oats per acre.			
		1915.		4-year aver.	
		Bush.	Lb.	Bush.	Lb.
1	Poor preparation	74	24	85	23
2	Good preparation	82	12	92	12
3	Extraordinary preparation	85	30	97	27

The results here indicate that thorough spring cultivation of fall ploughed land is beneficial.

SOIL PACKERS.

This experiment is for the purpose of obtaining information in regard to the use of soil packers. Three types of packers are compared, both with each other and with "no packing." The best time to pack is also being tried. All other operations in the land are kept as uniform as possible.

PACKING ON SUMMER-FALLOW.

Plot No.	Treatment given.	Yield of Wheat per acre.			
		1915.		4-year aver.	
		Bush.	Lb.	Bush.	Lb.
1	No packing	54	00	46	13
2	Packed with surface packer after seeding	59	20	50	52
3	Packed with surface packer after seeding, harrow after packing	55	20	46	40
4	Packed with subsurface packer after seeding	62	00	50	45
5	Packed with subsurface packer after seeding, harrowed after packing	51	10	42	35
6	Packed with combination packer after seeding	50	00	47	50
7	Packed with combination packer after seeding, harrowed after packing	48	50	47	33
8	Packed with surface packer both before and after seeding	62	00	49	20
9	Packed with subsurface packer both before and after seeding	63	10	50	15
10	Packed with combination packer both before and after seeding	56	40	47	45
11	Packed with surface packer before seeding	62	40	50	30
12	Packed with subsurface packer before seeding	57	10	47	38
13	Packed with combination packer before seeding	45	50	46	55
14	No packing	53	00	47	15
15	Packed with surface packer right after ploughing summer-fallow	54	20	46	58
16	Packed with subsurface packer right after ploughing summer-fallow	60	40	49	52
17	Packed with combination packer right after ploughing summer-fallow	54	40	47	17
18	Packed with surface packer right after ploughing summer-fallow and again in spring after seeding	51	40	48	32
19	Packed with subsurface packer right after ploughing summer-fallow and again in spring after seeding	52	40	48	38
20	Packed with combination packer right after summer-fallow and again in spring after seeding	56	40	49	50
21	No packing	57	00	48	2
22	No packing, grain harrowed when 6 inches high	55	20	46	13
23	Packed with surface packer when grain is 6 inches high	56	00	46	40
24	Rolled with smooth roller when grain is 6 inches high	55	20	46	13
25	No packing	55	20	45	25

SUMMARIES OF RESULTS ON SUMMER-FALLOW.

Kind of Packer.	Average yield for 4 years.
	Bush. Lb.
Surface packer (average of plots 2, 8, 11, 15 and 18)	49 14
Subsurface packer (average of plots 4, 9, 12, 16 and 19)	49 26
Combination packer (average of plots 6, 10, 13, 17 and 20)	47 55
No packer (average of plots 1, 14, 21, 25)	46 44

Time of Packing.	Average yield for 4 years.
	Bush. Lb.
After seeding (average of plots 2, 4 and 6)	49 49
Before seeding (average of plots 11, 12 and 13)	48 21
Before and after seeding (average of plots 8, 9 and 10)	49 7
At time of ploughing summer-fallow (average of plots 15, 16 and 17)	48 2
At time of ploughing summer-fallow and after seeding (average of plots 18, 19 and 20)	49 00

Packer *versus* Harrow as last Implement.	Average yield for 4 years.
	Bush. Lb.
Packer applied last (average of plots 2, 4 and 6)	49 49
Harrowed after packing (average of plots 3, 5 and 7)	45 36

The packed land gave greater average yields than the unpacked land. The combination packer gave smaller yields than the other two types of packer. Packing after seeding increased the yield more than packing before seeding. Packing before and after seeding appears no better than packing only after seeding.

Harrowing, surface packing and rolling when grain is 6 inches high, gave practically the same results as no packing.

PACKING ON SPRING PLOUGHING.

The land used for this part of the experiment as well as for the fall-ploughing section, which follows, had grown one crop of wheat after summer-fallowing.

PACKING ON SPRING PLOUGHING.

Plot No.	Treatment given.	Yield of Wheat per acre.	
		1915.	4-year aver.
		Bush. Lb.	Bush. Lb.
1	Packed with subsurface packer before seeding	58 30	42 10
2	Packed with surface packer before seeding	53 30	43 10
3	Packed with combination packer before seeding	55 10	42 42
4	Packed with subsurface packer before and after seeding	54 20	43 30
5	Packed with surface packer before and after seeding	58 40	42 45
6	Packed with combination packer before and after seeding	60 20	43 20
7	No packing	55 40	41 53
8	Packed with surface packer after seeding	53 50	42 5
9	Packed with subsurface packer after seeding	53 20	44 5
10	Packed with combination packer after seeding	50 00	41 23
11	No packing	50 00	41 10

SUMMARIES OF RESULTS ON SPRING PLOUGHING.

Kind of Packer.	Average yield for 4 years.
	Bush. Lb.
Surface packer (average of plots 2, 5 and 8)	42 40
Subsurface packer (average of plots 1, 4 and 9)	43 15
Combination packer (average of plots 3, 6 and 10)	42 28
No packer (average of plots 7 and 11)	41 31

Time of Packing.	Average yield for 4 years.
	Bush. Lb.
Before seeding (average of plots 1, 2 and 3)	42 41
After seeding (average of plots 8, 9 and 10)	42 31
Before and after seeding (average of plots 4, 5 and 6)	43 12

The average differences between methods on spring ploughing are so small that it would be unwise to draw conclusions from this portion of the experiment.

PACKING on Fall Ploughed Land.

Plot No.	Treatment Given.	Yield of Wheat per acre.	
		1915.	4-year aver.
		Bush. Lb.	Bush. Lb.
12	No packing	40 00	38 22
13	Packed with subsurface packer in the fall	39 20	39 25
14	Packed with subsurface packer in spring before seeding	35 10	38 18
15	Packed with subsurface packer in spring after seeding	37 40	39 5
16	Packed with surface packer in fall	36 50	38 5
17	Packed with surface packer in the spring before seeding	37 00	38 20
18	Packed with surface packer in the spring after seeding	34 00	38 00
19	Packed with combination packer in fall	33 00	38 5
20	Packed with combination packer in spring before seeding	37 10	38 55
21	Packed with combination packer in spring after seeding	29 20	37 30
22	No packing	34 30	37 28
23	Packed with surface packer in the fall and in spring after seeding	33 50	38 7
24	Packed with subsurface packer in the fall and in spring after seeding	29 20	37 15
25	Packed with combination packer in the fall and in spring after seeding	36 30	38 2

Kind of Packer.	Average yield for 4 years.
	Bush. Lb.
Surface packer (average of plots 16, 17, 18 and 23)	38 8
Subsurface packer (average of plots 13, 14, 15 and 24)	38 31
Combination packer (average of plots 19, 20, 21 and 25)	38 8
No packer (average of plots 12 and 22)	37 55

BRANDON.

Time of Packing.	Average yield for 4 years.
	Bush. Lb.
In fall (average of plots 13, 16 and 19)	38 32
In spring (average of plots 14, 17 and 20) before seeding	38 31
In spring after seeding (average of plots 15, 18 and 21)	38 12
In fall and in spring after seeding (average of plots 23, 24 and 25)	37 48

The uniform averages obtained as to type of packer, and time of packing on fall ploughing do not indicate anything decisive in any direction.

DEPTH OF SEEDING.

This experiment was tried with wheat on summer-fallowed land, and with oats on land which had grown one crop of wheat since summer-fallowing. All cultivation was as uniform as possible. A double disc drill was used.

Wheat on Summer-Fallow.

Plot No.	Depth of Seeding.	Yield of Wheat per acre.	
		1915.	4-year aver.
		Bush. Lb.	Bush. Lb.
1	1 inch	61 10	46 27
2	2 inches	57 50	48 00
3	3 inches	54 00	44 28
4	4 inches	45 10	48 15

Oats on Fall Ploughed Wheat Land.

Plot No.	Depth of Seeding.	Yield of Oats per acre.	
		1915.	4-year aver.
		Bush. Lb.	Bush. Lb.
1	1 inch	78 28	82 1
2	2 inches	72 12	79 8
3	3 inches	67 22	82 20
4	4 inches	89 4	79 00

With this year's crop, both in oats and wheat, the yield decreased as the depth increased. Plot 4, in oats, however, is an exception in this respect. No ground for conclusions is apparent in the results of the four-year averages.

COMMERCIAL FERTILIZERS.

Sixteen plots are used in this experiment. A four-year rotation is followed, consisting of wheat, oats, hay and corn. The fertilizers are applied only once in four years; that is, preceding the crop. They are applied on the surface in the spring and worked in just before seeding the corn. The year that the plots are in hay, plots

12 and 13 are supposed to be in clover while the rest are in grass. This is to test the fertilizing effect of clover on the after crops. The clover did not grow, however, so in the following table, plots 12 and 13 are marked no fertilizer.

YIELD of Wheat in 1915 on Corn Land which was fertilized the spring of 1914.

No.	Fertilizer Used.	1915 yields. Bush.	Lb.
1	Check—No fertilizer	55	50
2	Nitrate of soda, at rate of 160 pounds per acre	54	50
3	Superphosphate, at rate of 300 pounds per acre	52	50
4	Muriate of potash, at rate of 100 pounds per acre	46	00
5	Check—No fertilizer	51	00
6	Nitrate of soda, 160 pounds per acre; Superphosphate, 300 " "; Muriate of potash, 100 " "	52	40
7	Nitrate of soda, 160 " "; Superphosphate, 300 " "	55	10
8	Nitrate of soda, 160 " "; Muriate of potash, 100 " "	51	40
9	Superphosphate, 300 " "; Muriate of potash, 100 " "	43	40
10	Check — No fertilizer	44	30
11	Basic slag, 500 pounds per acre	44	50
12	No fertilizer	44	00
13	No fertilizer	44	30
14	Barnyard manure, 16 tons per acre	54	00
15	Barnyard manure, 8 tons per acre	53	40
16	Check — No fertilizer	45	00

UNDERDRAINAGE.

Ten plots are used in this experiment. Plot No. 3 and plot No. 8 are underdrained to a depth of 3 and 4 feet respectively. All other plots are undrained. A three-year rotation is in vogue on these plots, consisting of summer-fallow, wheat and wheat.

YIELD of Grain per Acre.

Plot No.	Wheat, 1911. Bush.	Lb.	Wheat, 1912. Bush.	Lb.	Summer-Fallow, 1913 Bush.	Lb.	Wheat, 1914. Bush.	Lb.	Wheat, 1915. Bush.	Lb.	Average of 4 years. Bush.	Lb.
1	45	40	34	00	.....		46	20	50	30	44	7
2	45	20	33	20	.....		46	20	46	40	42	55
3	43	40	32	40	.....		46	40	42	10	41	17
4	46	00	39	20	.....		45	20	45	00	43	55
5	42	40	24	00	.....		42	50	45	00	41	7
6	45	00	35	20	.....		43	30	45	00	42	12
7	43	20	34	40	.....		43	30	34	50	39	5
8	44	00	33	20	.....		45	20	35	20	39	30
9	48	20	36	00	.....		43	20	36	30	41	2
0	42	20	36	00	.....		42	00	40	10	40	7

	Bush.	Lb.
Average of 8 undrained plots	41	49
Average of 2 drained plots	40	23

BRANDON.

DATES OF SEEDING FLAX.

A test of dates of sowing flax was again carried out this year. A seeding was made each half-month from April 15 to June 15 inclusive. The land used was sandy loam that had been summer-fallowed. One half bushel of seed per acre was used in each case. Cultivation was as nearly uniform as practicable, but the later-sown plots had to have some extra cultivation to keep down weeds. The results in 1915 and the averages for the past two years are as follows:—

DATES of Seeding Flax.

Date of sowing.	Date of ripening.		Yield per acre.	
	1915	Average of 1914 and 1915.	1915	Average of 1914 and 1915.
			Bush. Lb.	Bush. Lb.
April 15	August 19		22 18	
May 1	August 19	August 12	26 9	19 16
May 15	August 22	August 15	27 23	19 41
June 1	August 26	August 23	20 55	15 2
June 15	September 15	September 14	5 20	5 00

The early part of May appears to be the best time. Flax sown in the middle of June has been a failure both seasons.

DATES OF SEEDING ALFALFA.

In 1914 a series of alfalfa plots was sown for the purpose of getting information on the best date for sowing alfalfa. The first sowing was made on May 1, and subsequent sowings were made every half-month until July 15. Good catches were obtained from the May sowings, fair from those in June, but poor from the plots sown in July, especially the July 15 seeding which was practically a failure. This year two cuttings were harvested off these plots. Although the June 15 and July 1 sowings gave thin stands, the yield has been nearly as large as from the thick stands obtained from early sowings. The yields obtained are as follows:—

DATES of Seeding—Alfalfa.

Date of sowing.	Yield per acre, first cutting.	Yield per acre second cutting.	Total Yield per acre for season.
	Tons Lb.	Tons Lb.	Tons Lb.
May 1	2 600	1 1,560	4 160
May 15	2 620	1 1,160	3 1,780
June 1	2 760	1 1,260	4 20
June 15	2 120	1 1,380	3 1,500
July 1	1 1,340	1 1,020	3 360
July 15	— 1,620	— 1,580	1 1,200

This is evidence toward the belief that alfalfa should be sown by June 1, if best results are to be obtained.

BRANDON.

RATE OF SEEDING—ALFALFA.

A trial of different rates of seeding for alfalfa was begun by sowing a series of plots in 1914. They were all sown on the same date, May 15, on summer-fallowed land. Good catches were obtained on all plots in 1914. Two cuttings were harvested in 1915 and the following yields obtained:—

RATES of Seeding—Alfalfa.

Quantity of seed used per acre.	Yield per acre, first cutting.		Yield per acre, second cutting.		Total yield per acre, for season.	
Lb.	Tons.	Lb.	Tons	Lb.	Tons	Lb.
20	2	1,220	2	680	5	1,900
17½	3	800	2	640	5	1,440
15	3	1,060	2	540	5	1,600
12½	3	1,580	2	780	6	360
10	3	1,020	2	840	5	1,860
7½	3	460	2	560	5	1,020

In so far as one season's results prove anything, it would appear that the quantities of seed that usually have been recommended in the past are unnecessarily large. However, conditions were unusually favourable for complete germination, and possibly such good results from light seeding might not be obtained with soil in conditions not quite so nearly ideal.

EFFECT OF CLOVERS AND GRASSES ON WHEAT YIELD.

In order to obtain definite data on the enriching effect on the land of leguminous hay crops, a range of plots that had grown these crops and grasses for a number of years was broken up and sown to wheat. The sod was broken in July 1914, after the hay was harvested, and backset the same fall. It was disced and harrowed enough to put the land in reasonably good tilth. Marquis wheat was sown on all plots in the spring of 1915. The yields obtained are as follows:—

Sequence of Crops.	Yield of Wheat per acre.	
	Bush.	Lb.
Wheat after alfalfa (average of 8 plots)	61	10
Wheat after red clover (average of 2 plots)	58	30
Wheat after alsike	57	40
Wheat after western rye grass	49	40
Wheat after red top	47	20
Wheat after timothy	43	60
Wheat after Kentucky blue grass	38	00
Wheat after brome grass	29	20

This is a striking illustration of the enriching effect of clovers and alfalfa as compared with grasses. It also shows the effect of brome grass in lowering the yield below other grasses on account of its persistent root system.

DRAINAGE AND CLEARING LAND.

During the year, about 20 acres of land that had been non-productive, was brought into shape to grow crops. Eight acres that had been planted with rows of trees in the early history of the Farm had become a wilderness and an unsightly spot. This was all cleared up during 1913 and 1914 and this year the land was ploughed shallow, and later in the season, backset. Another 12-acre field that was rather low, the centre of it being an undrained slough, was drained by running an open ditch to the river. This field was also broken and backset.

BRANDON.

EXPERIMENTAL FARM FOR SOUTHERN SASKATCHEWAN, INDIAN HEAD, SASK.

REPORT OF THE SUPERINTENDENT, W. H. GIBSON, B.S.A.

WEATHER COMMENTS.

The crop season of 1915 was favourable for the production of field crops in southern Saskatchewan. The spring opened comparatively early with the land in good tilth and seeding commenced April 6. Hay and pasture crops suffered as a result of the dry weather throughout April and May. However, a plentiful supply of moisture at intervals throughout the growing season ensured good grain yields. Harvest operations were general about August 10 and by September 1 the bulk of the crop was in stook.

Some Weather Observations taken at Indian Head Experimental Farm, 1915.

Month.	Temperature.					Rainfall.		Snowfall.		Total Sunshine.
	Maximum.		Minimum.		Mean.					
1915.	Date.	°	Date.	°	°	Days.	Ins.	Days.	Ins.	Hours.
January	18	30	27	−42	3·06	..	..	..	4·50	37·1
February	17	37	5	− 8	16·82	....	....	.....	5·25	71·6
March	21	51	2	−17	22·55	2	0·75	.....	.....	196·6
April	13	85	1	22	48·43	2	0·37	.....	....	202·0
May	31	87	7	13	50·10	4	1·37	.....	.....	198·5
June	24	80	7	26	53·53	10	2·32	.....	.....	169·4
July	7	84	24	33	58·32	6	1·92	.....	.....	191·4
August	10	95	1	34	64·60	4	1·75	....	....	267·2
September	6	80	12	25	47·23	9	3·92	2	2·50	98·0
October	18	70	7	18	42·13	2	0·24	.....	...	140·6
November	6	55	29	−10	21·56	.....	.....	8	18·50	60·9
December	6	39	30	−18	9·68	.....	.....	5	11·00	67·0
	....	.....	.....	.....	.....	39	12·64	15	41·75	1,699·3

FIELD CROP YIELDS.

YIELDS OF SPRING WHEAT.

In field tests four varieties of spring wheat, namely, Marquis, Red Fife, Pioneer and Prelude, were used. These were sown on corn land, fallow and stubble land. The Marquis wheat sown on corn land gave six bushels more per acre than Marquis on good summer-fallow.

SPRING WHEAT—Field lots.

Plot.	Variety.	Soil preparation.	Days maturing.	Yield per acre.	
				Bush.	Lb.
Rot. R, P. 7	Marquis	Corn land	123	50	52
Rot. R, P. 1	Marquis	Fallow	128	44	23
Rot. P, P. 6	Marquis, Ott. 15	Fallow	134	38	00
Field 6	Red Fife	Fallow	140	37	00
Field 6	Marquis, Ott. 15	Fallow	127	33	25
Rot. C, P. 1	Marquis	Fallow	137	32	56
Field 6	Pioneer	Fallow	132	32	30
Rot. J, P. 5	Marquis	Fallow	130	30	00
Field 6	Prelude	Fallow	122	24	45
Rot. J, P. 6	Marquis	Stubble	125	17	6
Rot. P, P. 7	Marquis	Stubble	125	14	4
Rot. C, P. 2	Marquis	Stubble	124	11	48

OATS—FIELD TESTS.

Three varieties of oats were grown in field lots, namely, Banner, Ligowo, and Victory. These were sown on summer-fallow and stubble land, between April 23 and April 29 and were ripe between August 10 and 24.

OATS—Field Tests.

Plot.	Variety.	Soil preparation.	Days maturing.	Yield per acre.	
				Bush.	Lb.
Field 6	Victory	Fallow	116	112	00
Field 6	Banner, Ott. 49	Fallow	117	78	25
Field 6	Ligowo	Fallow	116	69	32
Field 12	Banner	Fallow	116	67	8
Field 11	Banner, Ott. 49	Fallow	121	63	29
Field 11	Ligowo	Fallow	116	62	21
Rot. R, P. 8	Banner	Stubble	107	41	9
Rot. R, P. 2	Banner	Stubble	106	36	12
Rot. J, P. 1	Banner	Stubble	106	36	7

BARLEY—Field Tests.

Three varieties of barley were grown in field lots. Date of seeding April 24 to 29. The crop was harvested between August 9 and 14.

BARLEY.

Plot.	Variety.	Soil preparation.	Days maturing.	Yield per acre.	
				Bush.	Lb.
Field 6	Canadian Thorpe (two row)	Fallow	111	80	25
Field 9	O. A. C. 21 (six row)	Fallow	104	78	32
Rot. P, P. 2	Manchurian (six row)	Corn land	101	77	24
Field 6	Manchurian (six row)	Fallow	106	66	00
Field 6	Manchurian (six row)	Fallow	113	50	38
Field 7	Manchurian (six row)	Fallow	107	48	3

FALL RYE.

A field of 15¼ acres was sown to fall rye on August 27, 1914. This came through the winter in good condition and yielded a fair crop. The yield was 25 bushels 39 pounds per acre.

FLAX.

Three varieties of flax were sown on summer-fallow land. These were seeded on May 28 and harvested between September 15 and 25.

FLAX—Field Tests.

Plot.	Variety.	Soil preparation.	Days maturing.	Yield per acre.	
				Bush.	Lb.
Field 6	Novelty	Fallow	115	27	22
Field 6	Premost	Fallow	110	20	08
Field 6	Longstem	Fallow	120	12	46

PEAS.

A 5-acre plot of well prepared summer-fallow was sown to Arthur peas on April 15. These were harvested September 11, and yielded 49 bushels 13 pounds per acre.

COST OF PRODUCTION OF FIELD CROPS.

The following table includes the cost of production of field crops in 1915:—

Crop.	Soil preparation.	Cost per acre.	Cost per bushel	Cost per ton.	Value per acre.	Profit or loss per acre.
		$ c.	Cents.	$ c.	$ c.	$ c.
Wheat	Fallow	11 10	30·4	.....	31 09	19 99
Wheat	Stubble (fall ploughed)	11 52	80·6	.....	12 23	0 71
Wheat	Corn land	14 34	28·0	.....	43 75	29 41
Oats	Corn land (spring ploughed)	11 73	30·0	.....	14 90	3 17
Barley	Corn land	15 23	19·0	.....	42 78	27 55
Corn	Fallow, top dressed	15 36	.....	1 87	23 73	8 37
Hay	First crop after seeding with nurse crop	8 01	.....	14 65	6 62	−1 39

CROP ROTATION.

Crop rotation is the adoption of a certain succession of crops grown on the same soil at regular intervals. Rotations are necessary to maintain the fertility of the soil. A good rotation includes the application of barnyard manure, summer-fallow, hoed crop such as corn or roots, cereals, hay or pasture. Under most conditions the production of several crops is a safer and wiser plan than giving exclusive attention to one crop.

During the years 1910-11-12 a series of rotations considered more or less applicable for conditions that prevail in Southern Saskatchewan, was inaugurated with a view of determining their relative merits as crop producers.

Incorporated in these rotations are such crops as grain, corn, roots and hay, the production of which provides for the keeping of live stock, better and cleaner farming, and the maintenance of soil fertility.

The following is a description of these rotations:—

ROTATION "C" (THREE YEARS' DURATION).

First year.—Summer-fallow.

Second year.—Wheat.

Third year.—Wheat.

ROTATION "J" (SIX YEARS' DURATION).

First year.—Summer-fallow.

Second year.—Wheat.

Third year.—Wheat.

Fourth year.—Oats seeded down.

Fifth year.—Hay.

Sixth year.—Pasture.

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ROTATION "P" (EIGHT YEARS' DURATION)

First year.—Summer-fallow.
Second year.—Wheat.
Third year.—Wheat.
Fourth year.—Summer-fallow.
Fifth year.—Hoed crop (manured 15 tons per acre).
Sixth year.—Barley, seeded down.
Seventh year.—Hay.
Eighth year.—Pasture.

ROTATION "R" (NINE YEARS' DURATION).

First year.—Summer-fallow.
Second year.—Hoed crop (manured 15 tons per acre).
Third year.—Wheat.
Fourth year.—Oats.
Fifth year.—Summer-fallow.
Sixth year.—Wheat.
Seventh year.—Oats, seeded down.
Eighth year.—Hay.
Ninth year.—Pasture.

The following tables give the return values together with the

ROTATION

Rotation Year.	Crops. 1914.	Crops. 1915.	Area.	Items of Expense: Rent and manure.	Seed, twine and use of machinery.	Manual labour. Hours.	Manual labour. Cost.	Horse labour (including teamster). Hours. Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
			Ac.	$ c.	$ c.	No.	$ c.	No.	No.	No.	No.	No.
2nd	Fallow	Wheat	6·25	12 50	19 43½	19½	3 70½	....	10	22¼	2	.
3rd	Wheat	Wheat	6·25	12 50	18 76¾	12½	2 37½	....	4	55¾	5¾	.....
1st	Wheat	Fallow	6·25	12 50	3 75	.	.	....	.	104	...	.....
	Aggregate		18·75	37 50	41 95	32	6 08	.....	14	180	7·75	....
	Average per acre		...	2 00	2 24	1·71	32·4	....	0·75	9·71	0·41	...

ROTATION

6th	Fallow	Wheat	5·5	20 16	17 62	10½	2 00	....	12	17¼	1¼	.....
7th	Wheat	Oats	5·5	20 16	15 32	14¼	2 71	....	3	45½	3	.....
8th	Oats	Hay	5·5	20 16	16 06	8	1 52	3	10½	..	....	.....
9th	Hay	Pasture	5·5	20 16	16 06	2	38	....	11½	..	..	.....
1st	Pasture	Fallow	5·5	20 16	3 30			....	..	96	....	.....
2nd	Fallow	Corn	5·5	20 16	13 85	161	30 59	...	37	24	....	.....
3rd	Corn	Wheat	5·5	20 16	17 32	19½	3 70	....	12	32	2	.....
4th	Wheat	Oats	5·5	20 16	15 33	12½	2 37	....	3¾	43	5	.....
5th	Oats	Fallow	5·5	20 16	3 30		....	.....	4½	69	.....	.....
	Aggregate		49·5	181 44	118 16	82·75	43 27	3	94·25	326·75	11·25	...
	Average per acre		..	3 66	2 38	1·67	0 87	0·06	1·90	6·60	0·23	..

ROTATION

5th	Fallow	Corn	6	23 25	14 85½	122	23 18	.....	48½	28¼	....	.....
6th	Corn	Barley	6	23 25	18 03	29	5 51	.....	16	36½	2	.....
7th	Barley	Hay	6	23 25	17 52	18	3 42	3	15½	....	....	.....
8th	Hay	Pasture	6	23 25	17 52	...	...	.....	...	.....	....	.....
1st	Pasture	Fallow	6	23 25	3 60	.	....	.....	.....	94¼	..	.....
2nd	Fallow	Wheat	6	23 25	18 53½	16	3 04	.....	6¾	21½	2¼	.....
3rd	Wheat	Wheat	6	23 25	18 12½	10¾	2 04¼	.....	3	51¼	5¼	.....
4th	Wheat	Fallow	6	23 25	3 60	.	..	.....	.....	71½	....	.....
	Aggregate		48	186 00	111 81	195·75	37 19	3	89·75	303·25	9·50	.....
	Average per acre		.....	3 88	2 33	4·08	0 77	0·06	1·87	6·32	0·20	..

ROTATION

4th	Wheat	Oats	5	10 00	13 72¾	11½	2 18	.....	3	39¾	4¾	.....
5th	Oats	Hay	5	10 00	11 60	.....	.....	...	....	...	....	.....
6th	Hay	Pasture	5	10 00	11 60	.....	....	.	.....	....	....	.....
1st	Pasture	Fallow	5	10 00	3 00	..	..	....	....	88¾	....	....
2nd	Fallow	Wheat	5	10 00	15 27	10¾	2 05	.....	3¾	20	2¼	.....
3rd	Wheat	Wheat	5	10 00	15 07	9¾	1 85	.....	3	53½	5½	.....
	Aggregate		30	69 00	70 26	32	6 08	.....	9·75	202	12·5	.....
	Average per acre		.....	2 00	2 34	107	0 20	.....	0·33	6·73	0·42	

cost and profit per acre on the above mentioned rotations:—

"C" (Three years' duration).

in raising Crop.							Particulars of Crop.						
							Weight.						
Value of horse labour	Cost of threshing.	Total cost.	Cost of 1 acre.	Cost for 1 bushel.	Cost for 1 ton.	Height of stubble.	Grain.	Straw.	Hay.	Hoed crop.	Total value.	Value of crop per acre	Profit or loss per acre.
$ c.	$ c.	$ c.	$ c.	cts.	$ c.	Ins.	Lb.	Lb.	Lb.	Lb.	$ c.	$ c.	$ c.
13 48	14 42	63 54	10 16	30·8			12,360	24,720			177 15	28 34	18 18
26 97	5 18	65 79½	10 52	88·9			4,440	6,660			62 53	10 00	−0 52
42 64	....	58 89	9 42	....									−9 42
83 09	19 60	188 22									239 68		
4 43	1 04	....	10 03	....	....	....						12 75	2 75

"R" (Nine years' duration).

11 75	17 22	68 75	12 50	27·9			14,760	29,520			211 56	38 46	25 96
21 12	8 00	67 30¾	12 23	33·5			6,800	10,200			78 20	14 21	1 98
4 38	....	42 12	7 65						5,100		25 50	4 63	−3 02
3 91	....	40 51	7 36						4,423		22 12	4 02	−3 34
39 36	....	62 82	11 42										−11 42
22 42		87 02	15 82							77,000	115 50	21 00	5 18
18 16	19 58	78 92	14 34	28·0			16,790	33,580			240 65	43 75	29 41
21 30	9 20	68 36	12 42	28·0			7,820	11,730			89 93	16 35	3 93
29 82		53 28	9 68										−9 68
172 22	54 00	569 09									783 46		
3 48	1 10		11 49									15 82	4 33

"P" (Eight years' duration).

28 07¼		89 35¾	14 90							105,900	158 85	26 47	11 57
21 36½	23 25	91 43½	15 23	19·7			22,320	33,480			256 68	42 78	27 55
6 08	....	50 27	8 38						10,350		51 75	8 62	0 24
		40 77	6 74								48 00	8 00	1 26
38 64¼		65 49¼	10 91						Pasture 24 head 60 days.				−10 91
12 19	15 52	72 53½	12 09	32·3			13,305	26,610			190 70	31 78	19 69
24 55¼	6 09	74 06	12 34	85·1			5,220	7,830			73 51	12 25	−0 09
29 31½		56 16½	9 36										−9 36
160 22	44 86	540 08									779 49		
3 34	0 93		11 25									16 24	4 99

"J" (Six years' duration).

19 60	7 24	52 74	10 55	29·1			6,154	9,231			70 77	14 15	3 60
		21 60	4 32										−4 32
		21 60	4 32						Pasture 24 head 50 days.		40 00	8 00	3 68
36 39		49 39	9 88										−9 87
10 55	10 50	48 37	9 67	32·2			9,000	18,000			129 00	25 80	16 13
25 60	5 98	58 50	11 70	68·4			5,130	7,695			72 24	14 45	2 75
92 14	23 72	252 20									312 01		
3 07	0 79		8 40									10 40	2 00

The following values have been fixed: —

RETURN VALUES

Wheat	1¼ cents per pound or	80 cents per bush.	
Wheat—frozen	1 " "	60 " "	
Oats	1 " "	34 " "	
Barley	1 " "	48 " "	
Flax	3 " "	$1.68 per bush.	
Potatoes		50 cents per bush.	
Timothy hay		$10 00 per ton.	
Clover hay		10 00 "	
Alfalfa hay		12 00 "	
Brome hay		10 00 "	
Rye grass hay		10 00 "	
Mixed hay		10 00 "	
Oats straw		2 00 "	
Barley straw		2 00 "	
Wheat straw		1 00 "	
Pea straw		2 00 "	
Flax straw		2 00 "	
Corn stover, dry		5 00 "	
Corn ensilage		3 00 "	
Sugar beets		4 00 "	
Turnips		3 00 "	
Carrots		3 00 "	
Mangels		3 00 "	
Forage crops		10 00 "	
Pasture to be charged for at the following rates—			
Horse		1 00 per month.	
Cow		1 00 "	
Sheep		25 "	

COST VALUES.

Rent to be charged at $2 per acre.
Manure to be charged at $1 per ton (spread over rotation).
Seed wheat to be charged at $1.50 per bushel.
Seed oats to be charged at $1 per bushel.
Seed barley to be charged at $1 per bushel.
Grass and clover to be charged at actual cost but charged over the number of years in hay and pasture.
Seed corn (actual cost).
Twine (actual cost).
Machinery, 60 cents per acre.
Manual labour, charged at 19 cents per hour.
Horse labour—
1 horse 27 cents per hour.
2 horses 34 cents "
3 horses 41 cents "
4 horses 48 cents "
Additional horses 7 cents per hour.
Work done by tractor to be converted into horse labour and charged accordingly.
Threshing, charge work of teams hauling sheaves and of pitchers as horse and manual labour. Handling threshed grain, straw, machine, gasoline, etc., are covered by the charge per bushel.

Wheat	7	cents per bushel.
Oats	4	" "
Barley	5	" "
Flax	12	" "
Pease	7	" "

FENCING

During the past year three miles of woven wire fence was erected at an average cost of 86 cents per rod. Along the west boundary line, the posts were put down without using any preservative, while along the north boundary line the posts were treated with creosote. The average cost of treating was 10½ cents per post.

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CLEANING SHELTER BELTS.

Early in the spring work was commenced cleaning up the wind-breaks with the view of utilizing them as shade and pasture land for sheep.

ROADS.

The split log drag was again used on the Farm roads and driveways this season. By the use of this and the ordinary drag harrow the roads were kept in good condition throughout the entire summer.

SOIL CULTURAL EXPERIMENTS.

Experiments inaugurated in 1911 for the purpose of investigating some of the more important problems in soil cultivation are being carried on from year to year. The following comments will give an idea of the scope of this work:—

The results given herewith are based on an average taken from the yields of three successive years, 1913, 1914, and 1915, and, though the experiments have not been in operation a sufficient length of time to warrant these findings being taken as conclusive, yet some valuable suggestions have already been brought forward.

DEPTH OF PLOUGHING.

Various depths from three to eight inches and subsoiling four inches are compared in summer-fallow ploughing for wheat in this experiment.

Given herewith on a three-year-average in order of yields are the most significant results.

DEPTH of Ploughing Summer-fallow to be sown to Wheat.

Depth of ploughing summer-fallow.	Yield of wheat per acre.	
	Bush.	Lb.
Plough 8 inches deep, subsoil 4 inches..	42	00
Plough 6 inches deep, subsoil 4 inches..	41	27
Plough 8 inches deep..	40	40
Plough 6 inches deep..	40	40

Although from the foregoing results, subsoiling would appear at first sight to be beneficial, the yields following this practice are not so much in excess of results on land ploughed to a depth of from six to eight inches as to compensate for the additional expenses for labour incurred in the process of subsoiling.

It is worthy of note, however, that the effect of the subsoiling or very deep ploughing is always more noticeable on the second crop than on the first, even though the land is ploughed shallow preceding the second crop.

In this experiment wheat followed summer-fallow, while oats followed the wheat, the latter stubble having been ploughed in the fall to a depth of from 3 to 5 inches.

As immense damage to the fertility of a soil can be done by rash subsoiling, great care must be exercised in this operation. If at any time, it would be advisable to plough deeper than the ordinary limit of cultivation, the depth should be increased by degrees, half an inch or so each year.

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What may be gleaned then from this experiment on depth of ploughing is the importance of ploughing summer-fallow from 6 to 8 inches deep and fall ploughing for oats to a depth of 5 inches. Good judgment must always be exercised in that it is not necessary to plough heavy and newer lands quite so deeply as is advisable with lighter and older soils.

DEPTH OF PLOUGHING SOD TO BE SOWN TO WHEAT.

A test of ploughing sod at different depths of 3, 4 and 5 inches is carried on, the succeeding wheat stubble being also ploughed at these respective depths.

The following results bring out important suggestions:—

Depth of ploughing Sod to be sown to Wheat.

Depth of ploughing sod.	Yield of wheat per acre. Average of 3 years.	
	Bush.	Lb.
Plough 5 inches deep	29	33
Plough 4 inches deep	29	20
Plough 3 inches deep	29	07

Depth of Ploughing Wheat Stubble to be sown to Oats.

Depth of ploughing wheat stubble.	Yield of oats per acre. Average of 3 years.	
	Bush.	Lb.
Plough 5 inches deep	50	33
Plough 4 inches deep	50	13
Plough 3 inches deep	47	15

Results from the foregoing show an advantage in favour of ploughing sod to a depth of 5 inches as against shallower ploughing both in point of yield and also in the subduing of the grass, while ploughing the wheat stubble herein to be followed by oats substantiates the contention that such should be ploughed to a depth of 5 inches anyway.

SUMMER-FALLOW TREATMENT.

In the experiment on treatment of summer-fallow, the rotation followed is that used by the majority of farmers in southern Saskatchewan:—

First year.—Summer-fallow.

Second year.—Wheat.

Third year.—Wheat or oats.

As this practice means that one-third of the farm is in summer-fallow each season, information as to the best methods of summer-fallowing is of great importance.

INDIAN HEAD.

In 1911 an experiment including seventeen different kinds of treatment was started. From an average of three years' results the most important of these are herewith appended.

TREATMENT of Summer-fallow to be Sown to Wheat.

Treatment of summer-fallow.	Yield of wheat per acre. Average of 3 years.	
	Bush.	Lb.
Plough 4 inches June, cultivate; plough 4 inches September, harrow	48	27
Fall cultivate before summer-fallowing; plough 6 inches June, harrow and pack if necessary, cultivate as necessary	48	13
Plough 6 inches June, pack if necessary and practicable, cultivate as necessary	47	07
Plough 6 inches June, cultivate; plough 4 inches September, harrow	45	07
Plough 6 inches May 15, harrow and pack if necessary, cultivate as necessary	44	33
Plough 6 inches June, no packing, otherwise same as other plots	44	27
Plough 6 inches July 15, harrow and pack if necessary, cultivate as necessary	41	47

The following conclusions can be drawn from the foregoing results:—

It is not necessary to plough summer-fallow land twice.

The summer-fallow that is ploughed early invariably yields more highly than that which is ploughed late, the importance of finishing the ploughing before the end of June being, therefore, herein emphasized.

Fall cultivation, such as discing the land previous to summer-fallowing is good practice.

To attain best results summer-fallow land should be surface cultivated the fall before, ploughed early in June six to eight inches deep, harrowed immediately after ploughing and cultivated as necessary to maintain an efficient mulch and control weed growth.

The packer is not essential, but where available it will prove of benefit when used immediately after the harrowing of the newly ploughed land and following the harrowing of the land after seeding.

It might be well to note that in the third year, where oats follow the wheat, in which case all plots are treated alike, i.e., ploughed 6 inches deep in autumn, the foregoing conclusions are well substantiated, the inference being that the methods productive of the best results in the crop following the summer-fallow extend their influence to the next crop also.

STUBBLE TREATMENT.

This experiment includes several different methods of stubble treatment.

The following results based on an average of three years' returns bring out the most important features:—

TREATMENT of Wheat Stubble to be Sown to Wheat.

Treatment given wheat stubble preceding wheat.	Yield of wheat per acre. Average of 3 years.
	Bush. Lb.
Plough 4 inches in spring, seed at once	22 00
Disc harrow autumn	21 47
Burn stubble in spring, seed at once	21 13
Plough 4 inches in autumn, subsurface pack at once	21 07

TREATMENT of Wheat Stubble to be Sown to Oats.

Treatment given wheat stubble preceding oats.	Yield of oats per acre. Average of 3 years.
	Bush. Lb.
Cultivate autumn, plough 5 inches spring, seed	59 00
Plough 5 inches spring, seed, subsurface pack	54 17
Plough 5 inches autumn, subsurface pack at once	48 30

The conclusions from the foregoing are that methods calculated to conserve the moisture will give the highest yield.

As to whether spring ploughing for wheat has an advantage over fall ploughing depends altogether on relative conditions. If time is available and stubble land is in a condition to plough, not too dry and lumpy, fall ploughing would be practicable while the alternative of leaving such land to be ploughed in the spring would be a questionable policy, since the danger of a late spring might have to be faced.

From the foregoing results, discing the land in the fall with the object of forming a mulch to conserve whatever moisture might be in the soil, is a satisfactory practice.

For oats, cultivating the soil in the autumn and ploughing it in the spring gives higher yields than only ploughing in the spring without cultivation the previous fall, while, generally speaking, either of these methods seems to be more favourable to the oat crop than fall ploughing. Yet, where conditions of moisture are favourable fall ploughing for oats gives eminently satisfactory returns also.

SEEDING TO GRASSES AND CLOVERS.

This experiment comprises the seeding down of a mixture of western rye grass and red clover with and without a nurse crop on land prepared in different ways. Better results are obtained without nurse crops than with them but this increase in yield does

not compensate for the loss of the grain crop. This fact is especially true on well-prepared soil such as summer-fallow or corn land, either of which when worked makes a good seed-bed for a grass mixture.

BREAKING SOD FROM CULTIVATED GRASSES AND CLOVERS.

This test consists of an experiment whereby eight different methods of breaking sod are compared. This sod is composed of a mixture of timothy, western rye grass, red clover, and alfalfa. The results of one season are all that are available. These are given herewith, not because they are conclusive, but because they afford very striking comparisons. This land was broken according to the following outline in 1914, some of the plots being cropped that same year with wheat, peas, and flax, respectively. Another plot was summer-fallowed while the remaining plots were broken at different dates after a hay crop had been taken off each.

RESULTS in Order of Yields.

Treatment given.	Yield per acre.		
	1914 — Hay and grain.	1915 — Wheat.	Total value of crops.
	Tons. Lb.	Bush. Lb.	$ cts.
Plough May 15, work as summer-fallow	.....	54 40	43 73
Plough 3 inches early July, top-work, backset September, cultivate as necessary	1 680	44 40	49 13
Plough 5 inches July 20 to 30 pack and disc at once, disc in autumn	1 680	44 40	49 13
Stiff-tooth rip July, plough 5 inches September, cultivate as necessary.	1 160	36 40	40 13
	Bush. Lb.		
Plough 5 inches spring, seed same spring to wheat	6 40	30 40	34 59
Duplicate No. 5, sow flax	7 08	26 00	31 51
Repeat No. 5, sow peas	15 20	24 00	42 20
	Tons. Lb.		
Plough 5 inches October, pack, disc, harrow	1 1,600	16 40	31 33

The results of this experiment, though for practically one season only, still present some valuable suggestions. The foregoing figures speak for themselves in that they show that methods 2 and 3 are about the best for breaking sod.

APPLYING BARNYARD MANURE.

Several different methods of applying barnyard manure on corn, wheat, barley and oats are compared.

An average of three years' results goes to show that an application of manure does not seem to be warranted in any of the foregoing cases except in that of corn. A well-manured summer-fallow is the best preparation for corn, while it is also well to note in this connection that wheat following corn sown on well-manured summer-fallow will give as high yields as wheat on summer-fallow.

GREEN MANURE.

The ploughing under of green crops, i.e., peas and tares, compared with the application of barnyard manure is not so effective as the latter, while the green manure also causes the grain to be late in maturing, especially the second crop. In this experi-

ment wheat follows the year when green manure is ploughed under while oats follow the wheat, all plots previous to the oats being treated alike in preparation for this latter crop. Conclusions from results taken on a three-year average are that the ploughing under of green crops is not profitable.

SEED-BED PREPARATION.

Findings from this experiment go to show that thorough preparation of the seed-bed is always necessary in order to gain best results.

SOIL-PACKERS.

The surface, subsurface and combination packers are used in this experiment for wheat on summer-fallow, for wheat sown on spring ploughed stubble land and for wheat on autumn ploughed stubble land.

Results taken on a three-year's average show an advantage of all types of packing over no packing but little distinction between kinds of packers.

Soil Packing for Summer-fallow.

Treatment given.	Yield of wheat per acre. Average of 3 years.	
	Bush.	Lb.
Plough for summer-fallow before June 15, subsurface pack, cultivate, next spring smoothing harrow, seed, subsurface pack	51	27
Disc previous autumn, plough before June 15, cultivate as necessary; next spring harrow, seed, surface pack	50	00
Disc previous autumn, plough before June 15, cultivate as necessary; next spring, surface pack, harrow, seed	49	47
Plough for summer—fallow before June 15, combination pack, cultivate as necessary; next spring harrow, seed, subsurface pack, harrow	49	33
Disc previous autumn, plough before June 15, cultivate as necessary; next spring harrow, seed, subsurface pack, harrow	49	20
Disc previous autumn, plough before June 15, cultivate as necessary; next spring harrow, seed, surface pack, harrow	48	27

Soil Packing for Wheat sown on Spring-ploughed Stubble Land.

Treatment given.	Yield of wheat per acre. Average of 3 years.	
	Bush.	Lb.
Harrow, surface pack, harrow, seed, surface pack	32	13
Harrow, combination pack, harrow, seed	31	33
Harrow, combination pack, harrow, seed, combination pack	30	27
Harrow, surface pack, harrow, seed	28	53
Harrow, seed, combination pack	28	27
Harrow, subsurface pack, harrow, seed, subsurface pack	27	07

Soil Packing for Wheat sown on Autumn-ploughed Stubble Land.

Treatment given.	Yield of wheat per acre. Average of 3 years.	
	Bush.	Lb.
Surface pack in fall, seed in spring	28	27
Combination pack in fall, seed in spring	28	13
Combination pack in spring after seeding	27	00
No packer, harrow, seed	26	00
Surface pack in spring, then seed	25	47
Subsurface pack in spring, after seeding	24	13

Conclusions drawn from this experiment are that with intelligent use of harrows, discs, and cultivators, farming can be profitably undertaken without the addition of a packer. Where a man is in a position to afford its purchase, however, the surface packer for all-round general purposes will be found a profitable investment. It is a good practice to harrow the land immediately after ploughing, then pack, harrow before seeding and harrow and pack immediately after seeding.

DEPTH OF SEEDING.

Wheat and oats are sown to depths of from 1 to 4 inches. In this connection the important point is to be sure that the seed is placed deep enough to be in moist soil Generally speaking, however, a depth of from 2 to 3 inches is sufficient.

EXPERIMENTAL STATION FOR CENTRAL SASKATCHEWAN, ROSTHERN, SASK.

REPORT OF THE SUPERINTENDENT, WM. A. MUNRO, B.A., B.S.A.

SEASONAL NOTES.

The winter of 1914-15 was comparatively mild and scarcely more snow fell than was sufficient to make good sleighing. As a consequence, there was little spring flood and little time between the departure of snow and the commencement of spring work.

Seeding began on April 14, and was completed with very little interruption due to bad weather. After seeding very little rain fell, and on June 12 the temperature dropped to 24° F. This frost had the effect of weakening the grain plants, especially those that were rankest, while it had little effect upon the young weed plants that would otherwise have become smothered. As a consequence the grain had a set-back and the weeds made an advance, the grain crops showing more weeds in 1915 than for the four previous seasons. Very little rain fell all summer and although there was a fair yield on summer-fallow the yield on stubble land was far below the average.

Following is the meteorological record for the year:—

WEATHER Observations taken at Rosthern Experimental Station, 1915.

Month.	Temperature. F.			Total Precipitation.	Total Sunshine.
	Highest.	Lowest.	Mean.		
	°	°	°	Inches.	Hours.
January	30·3	−45·5	0·2	0·60	103·6
February	29·0	−13·3	8·8	0·50	134·7
March	43.0	−14·8	17·7	0·00	190·6
April	71·3	13·7	44·6	0·30	242·1
May	78·8	23·4	51·2	1·15	297·8
June	81·0	24·2	54·7	1·00	219·9
July	84·2	35·8	58·5	3·12	246·0
August	93·6	31·2	64·2	0·28	319·4
September	79·1	11·8	46·2	1·07	107·8
October	67·1	19·4	40·6	0·32	171·7
November	47·5	−16·6	18·7	0·95	119·9
December	28·0	−20·5	6·8	0·82	83·2
Total				10·11	2,236·7
Average for years 1911-12-13-14				16·24	2,201·4
Total for five growing months, April to August, 1915				5·85	1,323·2
Average for five growing months, 1911, '12, '13, '14				10·62	1,269·9

PRECIPITATION for the past five Growing Seasons, April 1 to August 15,

Month.	Year.					Average 4 years.
	1911.	1912.	1913.	1914.	1915.	1911-14.
	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.
April	0·86	0·67	0·26	0·63	0·30	0·61
May	2·38	2·15	1·26	1·96	1·15	1·94
June	3·55	2·81	1·87	2·00	1·00	2·56
July	2·89	5·25	3·80	1·40	3·12	3·33
August	0·43	0·23	2·24	0·13	0·02	0·76
Total	10·11	11·11	9·43	6·12	5·59	9·20

CROP YIELDS.

The addition of three quarter-sections of land to the Experimental Station increased our field work in 1915 over that in previous years. The northeast quarter was summer-fallowed except for about 40 acres, most of which was broken during the summer. Seventy-nine acres of the southeast quarter had been summer-fallowed in 1914. This area was sown to Banner oats, and yielded at the rate of 46⅝ bushels per acre. Thirty-one acres of the remainder has been cropped for a number of years. This was spring ploughed and sown to oats which yielded at the rate of 27 bushels per acre. Nineteen acres which had also been cropped for a number of years was sown to O.A.C. 21 barley and yielded at the rate of 21⅜ bushels per acre.

More than a fourth of the southwest quarter is taken up with a slough. Ninety acres were sown to oats on late spring ploughing, and the crop was cut green for hay, of which there were 67 tons. Twenty-seven acres that had been cropped twice since breaking was sown to O.A.C. 21 barley and yielded at the rate of 21⅛ bushels per acre.

ROTATION OF CROPS.

The work begun in rotation of crops in 1911 has been continued with varying results, depending upon the nature of the season. The greatest variation appears in forage crops, and particularly in hay and corn. In 1912 the yield of corn was 15½ tons per acre and of hay 2½ tons per acre. In 1913 the yield of corn was 19¾ tons per acre, and hay 1¼ tons per acre. In 1914 and 1915 there was no crop of either, the corn being a failure because of late spring and early autumn frosts and the hay also failing because of the drought. This shows the profits from those rotations which include a hay or corn crop to be much lower in 1914 and 1915 than in previous years.

There are four rotations, and the fields are each of 2 acres area. A record is kept of the expense of working each field, and of all the materials used on them in the way of seed and fertilizer. Credit is given for all returns in the way of grain or forage.

The profits per acre from the four rotations under consideration at this Station for the past four years are as follows:—

Rotation.	Profit per acre.				
	1912.	1913.	1914.	1915.	Average of 4 years.
	$ c.	$ c.	$ c.	$ c.	$ c.
"C"—(three years' duration).....	3 89	9 81	6 92	6 82	6 86
"J"—(six years' duration).....	5 56	10 26	6 41	5 30	6 88
"P"—(eight years' duration).....	7 65	5 79	5 39	4 00	5 71
"R"—(nine years' duration).....	11 26	14 59	10 04	7 66	10 88

ROTATION "C" (THREE YEARS' DURATION).

First year.—Summer-fallow.

Second year.—Wheat.

Third year.—Wheat.

This is the rotation generally recommended for the beginner. It involves small expense in operation, equipment, and seed, and gives quick returns in cash. It returns nothing to the soil and produces nothing that answers for feed and consequently cannot be used satisfactorily for more than a few years.

ROTATION "J" (SIX YEARS' DURATION).

First year.—Wheat.

Second year.—Wheat.

Third year.—Oats seeded down to western rye grass, alfalfa and red clover.

Fourth year.—Hay.

Fifth year.—Hay or pasture.

Sixth year.—Summer-fallow.

Rotation "J" calls for a division of the farm into five fields and, as well as supplying wheat from two-fifths of the area of the farm, affords oats and hay for a considerable amount of live-stock. This is a rotation representing a transition from the all wheat farming stage of Rotation "C" to the all stock raising stage of a rotation involving more forage crops.

ROTATION "P" (EIGHT YEARS' DURATION).

First year.—Wheat.

Second year.—Wheat.

Third year.—Summer-fallow.

Fourth year.—Roots.

Fifth year.—Barley seeded down to western rye grass, alfalfa and red clover.

Sixth year.—Hay.

Seventh year.—Hay or pasture.

Eighth year.—Summer-fallow.

Rotation "P" is a rotation suitable for a farm carrying a large amount of stock. It is expensive to work on account of the root crop, but gives a high yield of forage.

ROSTHERN.

Owing to the partial failure of the hay crop in 1914 and the root crop in 1915 and the total failure of the hay crop in 1915, the profit from this rotation is rather low. A rotation like this one ensures a clean farm.

ROTATION "R" (NINE YEARS' DURATION).

First year.—Summer-fallow.

Second year.—Corn.

Third year.—Wheat.

Fourth year.—Oats.

Fifth year.—Summer-fallow.

Sixth year.—Wheat.

Seventh year.—Oats seeded to western rye grass, alfalfa, and red clover.

Eighth year.—Hay.

Ninth year.—Hay or pasture.

Notwithstanding the total failure of the corn and hay crop in 1915 and the partial failure of both in 1914, this rotation shows the greatest average profit of any of the rotations tried. It is less expensive than rotation "P" and provides fields as free from weeds as is possible under farm conditions. The summer-fallow followed by either corn or roots leaves the ground free from wild oats and almost free from other weeds.

ROTATION

Rotation Year.	Crops. 1914.	Crops. 1915.	Area.	Items of Expense: Rent and manure.	Seed, twine and use of machinery.	Manual labour. Hours.	Manual labour. Cost.	Horse labour (including teamster). Hours. Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
			Ac.	$ c.	$ c.	No.	$ c.	No.	No.	No.	No.	No.
3rd	Wheat	Wheat	2	4 00	4 36	1	0 19	....	2	8¾	1¼	....
1st	Wheat	Summer-fallow	2	4 00	1 20	....	....	....	....	1I	2	....
2nd	Summer-fallow	Wheat	2	4 00	4 75	1½	0 28	....	2	8½	2¾	....
	Aggre ate		6	12 00	10 31	2½	0 47	....	4	8¼	6	....
	Average per acre, 1915		....	2 00	1 72	·4	0 08	....	....	....	....	....

ROTATION

5th	Oats seeded	Hay	2	4 00	4 52	....	....	....	....	....	....	....
6th	Hay	Hay	2	4 00	52	....	....	....	....	5	1½	....
1st	Hay	Summer-fallow	2	4 00	1 20	....	....	....	....	9½	4½	
2nd	Summer-fallow	Wheat	2	4 00	5 80	2	0 38	....	3	7¾	2¾	
3rd	Wheat	Wheat	2	4 00	4 53	1½	0 25	....	3	7¾	2¾	....
4th	Wheat	Oats seeded	2	4 00	3 58	4½	0 86	....	2¼	3½	¾	....
	Aggregate		12	24 00	24 15	7·8	1 49	....	8¼	32·8	12·25	....
	Average per acre, 1915			2 00	2 01	0·65	0 12	....	0·68	2·73	1·02	....

ROTATION

5th	Summer-fallow	Roots	2	7 75	8 55	153½	29 16	7¼	2	4½	1½	....
6th	Roots	Barley	2	7 75	3 66	4	0 76	....	2¼	3	¾	....
7th	Barley	Hay	2	7 75	4 62	¾	0 15	....	....	....	....	....
8th	Hay	Hay	2	7 75	4 62	¾	0 15	....	....	5	1½	....
1st	Hay	Summer-fallow	2	7 75	1 20	....	....	....	....	12	3	....
2nd	Summer-fallow	Wheat	2	7 75	4 89	2½	0 48	....	3¼	8	2¾	....
3rd	Wheat	Wheat	2	7 75	4 54	2	0 38	....	3	7½	1¼	....
4th	Wheat	Summer-fallow	2	7 75	1 20	....	....	....	....	5	8	....
	Aggregate		16	62 00	33 28	163·5	31 08	7¼	10½	45	18¾	....
	Average per acre, 1915		....	3 87	2 08	10·2	1 94	66·45	0·77	2·81	1·17	....

ROTATION

5th	Oats	Summer-fallow	2	7 33	1 20	....	....	....	....	9	3½	....
6th	Summer-fallow	Wheat	2	7 33	4 81	2	0 38	....	3	7½	1¼	....
7th	Wheat	Oats seeded	2	7 33	3 45	3	0 57	....	2½	3	¾	....
8th	Oats seeded	Hay	2	7 33	4 42	....	....	....	....	....	....	....
9th	Hay	Hay	2	7 33	4 42	....	....	....	....	5	2½	....
1st	Hay	Summer-fallow	2	7 33	1 20	....	....	....	....	9	9½	....
2nd	Summer-fallow	Corn	2	7 33	8 41	....	....	12	5	5	9½	....
3rd	Corn	Wheat	2	7 33	4 86	2	0 38	....	3	6	1¼	....
4th	Wheat	Oats	2	7 33	3 42	2	0 38	....	1¼	8¾	¾	....
	Aggregate		18	65 97	36 19	9	1 71	12	14½	53¼	28¾	.. ..
	Average per acre, 1915		....	3 66	2 01	0·5	0·095	·6	0·8	2·9	0·6	....

SESSIONAL PAPER No. 16

"C" (Three years' duration.)

in raising Crop.							Particulars of Crop.						
							Weight.						
Value of horse labour.	Cost of threshing.	Total cost	Cost of 1 acre.	Cost for 1 bushel.	Cost for 1 ton.	Height of stubble.	Grain.	Straw.	Hay.	Hoed crop.	Total value.	Value of crop per acre.	Profit or loss per acre.
$ c.	$ c.	$ c.	$ c.	cts.	$ c.	Ins.	Lb.	Lb.	Lb.	Lb.	$ c.	$ c.	$ c.
4 86	2 41	15 82	7 91	45·8	....	5	2,070	2,430	.....	.....	28 81	14 40	6 49
5 47	.....	10 67	5 33	..	.....	...	..	..	.....	.....	.....	... .	—5 33
5 48	5 00	19 51	9 75	26·9	....	6	4,295	5,545	.....	.....	60 04	30 02	20 27
15 81	7 41	46 00	22 99	.....	.....	.....	.....	.....	.....	.....	88 85	44 42	21 43
2 63	1 23	....	7 76	.....	.....	.....	.....	.....	.....	.....	.....	14 81	7 15

"J" (Six years' duration.)

..	....	8 52	4 26	.....	....	.....	.....	.....	.....	.....	.....	.....	—4 26
2 77	.....	11 29	5 65	.....	.....	.....	.....	.....	.....	.....	.....	.....	—5 65
6 05	.....	11 25	5 62	.....	.....	.....	.....	.....	.....	.....	.....	.....	—5 62
5 35	4 81	20 34	10 17	29·5	9 86	6	4,125	5,197	.....	.....	57 60	28 80	18 63
5 41	2 52	16 71	8 35	46·1	15 40	4	2,170	2,484	.....	.....	30 17	15 08	6 73
2 55	2 53	13 52	6 75	21·4	.....	5	2,148	2,234	.....	.....	23 71	11 85	5 10
22 13	9 86	81 63	40 81	.....	.....	.....	.....	.....	.....	.....	111 48	55 73	14 93
1 84	0 82	...	6 80	.....	.....	.....	.....	.....	.....	.....	.....	9 29	2 49

"P" (Eight years' duration.)

5 20	...	50 66	25 33	..	3 11	....	.....	.....	.....	32,540	48 81	24 40	—0 93
2 35	4 33	18 85	9 43	21·8	.....	5	4,150	4,890	.....	.....	46 39	23 19	13 76
...	...	12 52	6 26	.....	.....	.....	.....	.....	.....	.....	.....	.....	—6 26
2 77	.....	15 29	7 64	.....	.....	.....	.....	.....	.....	.....	.....	.....	—7 64
6 36	..	15 31	7 65	.....	.....	.....	.....	.....	.....	.....	.....	....	—7 65
5 70	4 42	23 24	11 62	36·8	.....	....	3,788	4,432	.....	.....	52 72	26 36	14 74
4 69	2 32	19 68	9 84	59·2	.....	....	1,995	2,407	.....	.....	27 80	13 90	4 06
5 89	..	14 84	7 42	.....	.....	.....	.....	...	.....	.....	.....	.....	—7 42
32 96	11 07	170 39	85 19	.....	.....	.....	.....	.....	.....	.....	175 72	87 85	2 67
2 06	0 69	.....	10 65	.....	.....	.....	.....	.....	.....	.....	.....	10 98	0 33

"R" (Nine years' duration.)

5 37	..	13 90	6 95	.....	.....	.....	.....	.....	.....	.....	.....	.....	- 6 95
4 69	4 90	22 11	11 05	31·6	.....	6	4,200	5,580	.....	.....	58 79	29 40	18 35
2 35	2 80	16 50	8 25	23·6	.....	4	2,401	2,837	.....	.....	26 84	13 42	5 17
..	..	11 75	5 87	..	.....	.....	.....	.....	.....	.....	.....	... .	- 5 87
3 25	..	15 00	7 50	.....	.....	.....	.....	.....	.....	.....	.....	....	- 7 50
8 25	...	16 78	8 39	....	....	.....	.....	.....	.....	.....	.....	.....	- 8 39
11 53	...	27 29	13 64	.....	.....	.....	.....	.....	.....	.....	.....	.....	-13 64
4 08	5 58	22 23	11 12	27·9	.....	5	4,785	6,435	.....	.....	67 02	33 51	22 39
4 25	3 08	18 46	9 23	23·8	.....	4	2,639	2,911	.....	.....	29 30	14 65	5 42
43 79	16 36	164 02	82 00	.....	.....	....	.....	.....	.....	.....	181 95	91 08	9 70
2 43	0 91	9 11	9 11	.....	.....	...	.....	.....	.....	.....	.....	10 12	1 01

COST OF PRODUCTION.

Cost of Production of Wheat on Summer-Fallow.

Cost of Summer-fallow, 1914.

Number of acres, 2.

Rent of land at $2 per acre for one year	$ 4 00
Two-horse team harrowing, 1½ hours at 34 cents	51
Three-horse team ploughing and cultivating 9¾ hours at 41 cents	4 00
Four-horse team packing, 1 hour at 48 cents	48
Use of machinery	1 20
	$10 19
Cost per acre	5 05

Cost of Wheat Crop in 1915 on Summer-fallow of 1914.

Rent of land at $2 per acre for one year	$ 4 00
Two-horse team, seeding, 2 hours at 34 cents	68
Three-horse team, packing and binding, 8½ hours at 41 cents	3 48
Four-horse team, harrowing, 2¾ hours at 48 cents	1 32
Manual labour, 1½ hours at 19 cents	28
Seed, twine and machinery	4 75
Cost of threshing, 71·6 bushels at 7 cents	5 00
	$19 51
Cost per acre	9 75
Total cost of crop of wheat on one acre	14 80

Yield per acre, 35·8 bushels.
Cost per bushel, 41·4 cents.

Cost of Producing Roots and Barley in the Order of Summer-Fallow, roots, barley, half the cost of Summer-Fallow being Charged against the roots and half against the Barley.

Summer-fallow, 1913.

Number of acres, 2.

Rent of land at $2 per acre for one year	$ 4 00
Manure	3 33
Use of machinery	1 20
Three-horse team, ploughing and cultivating, 10½ hours at 41 cents	4 20
Four-horse team, packing, 1 hour at 48 cents	48
	$13 21
Cost per acre	6 65

Cost of Root Crop following Summer-fallow, 1914.

Rent of land at $2 per acre for one year	$ 4 00
Manure	3 75
Seed and machinery	8 55
Manual labour, thinning, hoeing, topping, 153½ hours at 19 cents	29 16
One horse, scuffling, 7¼ hours at 27 cents	1 96
Two-horse team, harrowing, 2 hours at 34 cents	68
Four-horse team, digging, 1½ hours at 48 cents	72
	$50 66
Cost per acre, including half the cost of the summer-fallow	28 65
Cost per ton	3 54

Cost of Barley following Root Crop, 1915.

Number of acres, 2.

Rent and manure	$ 7 75
Seed, twine, and use of machinery	3 66
Manual labour, shocking, 4 hours at 19 cents	76
Two-horse team, seeding, 2¼ hours at 34 cents	76
Three-horse team, packing and binding, 3 hours at 41 cents	1 23
Four-horse team, harrowing, ¾ hours at 48 cents	36
Cost of threshing	4 33
	$18 85
Cost per acre, including half cost of summer-fallow	12 75

Yield per acre, 43·2 bushels.
Cost of 1 bushel, 29·4 cents.

ROSTHERN.

The following tables of fixed values are used in estimating the cost and return values of crops from year to year on the rotations and for determining the cost of production:—

Cost Values.

Rent	per acre.	$ 2 00
Barnyard manure spread (charged equally over all years or rotation)	per ton.	1 00
Seed wheat	per acre.	1 50
Seed oats	"	1 00
Seed barley	"	1 00
All other seeds charged at actual cost. Cost of grass seed charged equally on the years producing grass.		
Twine charged at actual cost.		
Machinery	per acre.	·60
Manual labour	per hour.	·19
Horse labour (including teamster)—		
Single horse	"	·27
Two-horse team	"	·34
Three-horse team	"	·41
Four-horse team	"	·48
Each additional horse	"	·07
Threshing (covering work from stook to granary)—		
Wheat	per bush.	·07
Oats	"	·04
Barley	"	·05
Flax	"	·12
Peas	"	·07

Return Values.

Wheat (from the machine)	per lb.	1⅓ cents.
Barley "	"	1 cent.
Oats "	"	1 cent.
Peas "	"	1⅓ cents.
Flax "	"	3 cents.
Timothy hay	per ton.	$10 00
Red clover hay	"	10 00
Alfalfa hay	"	12 00
Brome grass hay	"	10 00
Western rye grass hay	"	10 00
Mixed hay	"	10 00
Green hay	"	10 00
Oats straw	"	2 00
Barley straw	"	2 00
Pea straw	"	2 00
Wheat straw	"	1 00
Flax straw	"	2 00
Dry corn stalks	"	5 00
Corn ensilage	"	3 00
Mangels and turnips	"	3 00
Sugar beets	"	4 00
Pasture, each horse	per month.	1 00
" cow	"	1 00
" sheep	"	25

CULTURAL INVESTIGATION WORK.

The work begun in 1911 in cultural investigation has nearly all been continued ever since, in some cases with marked results, while in others the results vary with the nature of the season. The yields are all computed from the yields obtained on one-fortieth-acre plots.

Depth of Ploughing Wheat Stubble to be sown to Oats.

Depth of ploughing wheat stubble.	Average of 4 years.	Yield 1915.
	Bush.	Bush.
Ploughed 3 inches deep	77·6	43·5
" 4 " "	77·06	50·5
" 5 " "	62·3	33·4

Depth of Ploughing Summer-fallow to be sown to Wheat.

Depth of ploughing summer-fallow.	Average of 4 years.	Yield, 1915.
	Bush.	Bush.
Ploughed 3 inches deep	34·5	38·0
" 4 " "	33·9	37·6
" 5 " "	35·6	40·0
" 6 " "	36·25	41·6
" 7 " "	35·6	41·3
" 8 " "	34·0	39·6
" 5 " " Subsoil, 4 inches	38·4	37·4
" 6 " " " "	36·4	35·0
" 7 " " " "	20·9	34·0
" 8 " " " "	37·08	33·3

SUMMER-FALLOW TREATMENT.

The field of oats is on the land that had been summer-fallowed two years previously.

TREATMENT of Summer-fallow to be sown to Wheat followed by Oats.

Plot No.	Treatment of summer-fallow previous to wheat.	Yield per acre. Average of 3 years.		Yield per acre. 1915.	
		Yield of Wheat on summer-fallow.	Yield of Oats, second season.	Yield of Wheat on summer-fallow.	Yield of Oats, second season.
		Bush.	Bush.	Bush.	Bush.
1	Plough 4 inches June, pack, cultivate	35·0	66·26	40·0	25·8
2	Plough 6 inches June, cultivate	37·1	77·2	40·3	34·4
3	Plough 8 inches June, cultivate	37·1	71·35	40·0	34·4
4	Plough 4 inches June, 4 inches September, cultivate and harrow	34·1	78·62	36·0	36·47
5	Plough 6 inches June, cultivate; 6 inches September, harrow	31·5	73·1	35·16	35·29
6	Plough 8 inches June, cultivate; 8 inches September, harrow	30·0	77·5	30·6	30·0
7	Plough 6 inches June, cultivate; 4 inches September, harrow	29·8	75·8	29·6	34·7
8	Plough 4 inches June, cultivate; 6 inches September, harrow	26·21	76·6	25·6	30·0
9	Plough 4 inches June, early as possible; cultivate; 6 inches September, leave untouched	26·3	82·35	21·1	55·8
10	Plough 5 inches June, seed to rape and pasture	21·7	79·79	22·6	58·8
11	Plough 6 inches May, harrow and pack, cultivate	26·76	80·38	26·0	50·58
12	Plough 6 inches June, harrow and pack, cultivate	34·1	71·17	23·6	37·05
13	Plough 6 inches July, harrow and pack, cultivate	35·5	81·26	27·6	42·9
14	Plough 6 inches June, Fall cultivate before summer-fallowing, harrow and pack, cultivate	35·6	90·38	25·0	50·29
15	Plough 4 inches June, before summer-fallowing, harrow, pack, cultivate	34·21	78·61	21·3	48·23
16	Plough 6 inches June, pack, cultivate	34·5	79·58	26·6	44·1
17	Plough 6 inches June, cultivate	35·21	59·58	25·6	35·8

STUBBLE TREATMENT.

This experiment consists of ten different methods of treating stubble land for wheat and three in treating stubble land for oats.

TREATMENT of Wheat Stubble to be sown to Wheat.

Plot No.	Treatment given wheat stubble preceding wheat.	Average of 4 years.	Yield per acre, 1915.
		Bush.	Bush.
1	Plough—Autumn	16·6	14·0
2	Disc, harrow—Autumn	18·91	21·3
3	Burn stubble, then disc—Autumn	19·05	18·6
4	Burn stubble, then plough—Autumn	21·08	22·0
5	Burn stubble in spring; seed at once	17·5	24·6
6	Plough in spring; seed at once	15·25	17·3
7	Disc at cutting time; spring plough	17·83	24·6
8	Disc at cutting time—Autumn plough	17·3	23·0
9	Plough autumn; subsurface pack at once	17·25	23·3
10	Plough Spring; seed; subsurface pack	15·3	19·3
11	Plough—Autumn; subsurface pack at once	63·8	41·76
12	Plough—Spring; seed, subsurface pack	72·5	47·5
13	Cultivate—Autumn; Spring—plough; seed	69·7	45·8

APPLICATION of Barnyard Manure for Root Crop.

Plot No.	Method of Application.	Yield per acre. Average of 4 years.	Yield per acre, 1915.
		Tons. Lb.	Tons. Lb.
1	No manure, second year stubble, ploughed in autumn	12 150	4 1,000
2	Apply on surface in autumn after ploughing second year stubble, and work in at once	22 800	2 1,600
3	Apply in spring on surface of ploughed land, second year stubble and work in at once	20 860	5 1,840
4	Plough in autumn right after applying, second year stubble	21 750	5 1,200
5	Plough in spring right after applying, second year stubble	18 1,900	7 1,840
6	Winter apply, plough in spring, second year stubble	18 125	6 .....
7	Winter apply, green manure (cut straw) on second year stubble—plough in spring	15 910	7 80
8	Winter apply, green manure (cut straw) on summerfallow, disc in	22 1,400	11 1,520
9	Summer-fallow, hoed crop, wheat	24 1,400	8 240

GREEN MANURING.

Green Manuring for Wheat followed by Oats.

Plot No.	Treatment of land previous to wheat.	Average per acre for 3 years.				1915.			
		1st crop, Wheat.		2nd crop, Oats.		1st crop, Wheat.		2nd crop, Oats.	
		Bush.	Lb.	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
1	Summer-fallow	38	30	74	10	38	00	58	28
2	Peas, two bushels per acre ploughed under early in July	34	15	68	28	27	40	36	10
3	Peas, two bushels per acre ploughed under when in blossom	30	33	73	24	22	20	43	18
4	Tares, 1 bushel per acre, ploughed under late July	31	13	87	15	26	00	40	00
5	Summer-fallow, barnyard manure, 12 tons per acre, applied in September	46	46	85	30	40	40	46	16
6	Summer-fallow	35	6	74	10	39	20	41	20

DEPTH OF SEEDING.

Depth of Seeding Wheat and Oats.

Plot No.	Depth sown.	Average Yield per acre, for 4 years.				Yield per acre, 1915.			
		Wheat.		Oats.		Wheat.		Oats.	
		Bush.	Lb.	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
1	1 inch deep	42	50	110	10	30	40	100	00
2	2 inches deep	46	55	137	27	42	20	87	22
3	3 inches deep	42	00	135	25	46	20	109	14
4	4 inches deep	57	25	134	14	40	00	111	26

EXPERIMENTAL STATION FOR NORTHWESTERN SASKATCHEWAN, SCOTT, SASK.

REPORT OF THE ACTING SUPERINTENDENT, MILTON J. TINLINE, B.S.A.

WEATHER AND CROP CONDITIONS 1915.

Spring opened up comparatively early, with seeding general by April 13. Up to the 10th of April the weather continued cool, but the latter part of the month was quite seasonable. The soil was in ideal condition, consequently germination of all kinds of seeds was prompt and uniform.

May, June, and July were cooler than usual, with a total rainfall of 3·54 inches for June: this, together with the abundant supply of moisture remaining in the soil from the previous autumn, caused an unusually rapid growth of grain crops. Commencing with August 3, warm, dry weather set in and hastened the maturity of cereal crops, but decreased the yield of corn, field roots, and potatoes, and also weakened the catch of grass and clover.

Sharp frosts, as late as June 16, injured corn, potatoes, etc., and in some sections froze the grain crops almost to the ground. The crops, however, quickly recovered from this setback. Unusually severe frosts were experienced early in September, destroying all uncut fodder corn, and damaging the field roots and potatoes.

Outstanding features connected with the production of the field crops grown in northwestern Saskatchewan in 1915, were:—

First—The large acreage sown.

Second.—The uniformly heavy yields secured from grain crops.

Third.—The rapidity with which the large crop was harvested.

Some Weather Observations taken at Scott Experimental Station, 1915.

Month.	Temperature F.			Precipitation.				Total Sunshine.
	Highest.	Lowest.	Mean.	Rainfall.	Snowfall.	Total.	Heaviest in 24 hours.	
	°	°	°	Inches.	Inches.	Inches.	Inches.	Hours.
January	31·8	−42·0	1·4	.....	1·0	·10	·10	89·0
February	30·2	−10·8	13·2	.....	1·5	·15	·10	111·5
March	44·8	−4·8	41·1	.....	·5	·05	·05	216·7
April	76·8	20·2	48·6	·90	.....	·90	·50	286·8
May	76·0	26·6	51·1	1·40	.....	1·40	·75	264·0
June	75·0	29·5	53·3	3·54	.....	3·54	·92	208·4
July	80·6	32·8	58·7	2·11	.....	2·11	·63	258·9
August	91·8	31·0	64·6	·48	.....	·48	·14	309·7
September	79·0	9·0	46·9	·98	.....	·98	·27	145·7
October	68·5	14·2	41·1	·25	.....	·25	·25	168·1
November	51·2	−12·8	19·1	.....	4·0	·40	·20	113·7
December	38·2	−10·6	12·5	.....	1·0	·10	·05	72·0
Total for year				9·66	8·0	10·46	.....	2,244·5
Total for six growing months, April to September						9·41	.....	1,473·5

FIELD Crop Yields.

Crop.	Preceding Crop.	Preparatory Treatment.	Yield per acre.	
			Bush.	Lb.
Wheat	Peas	Spring ploughed	49	24
Wheat	Summer-fallow	Ploughed June, 1914	41	55
Wheat	New Land	Broken June, 1914	36	39
Wheat	Wheat	Autumn ploughed	36	17
Barley	Peas	Disc-harrowed in spring	47	14
Barley	New Land	Broken June, 1914	42	9
Oats	New Land	Broken June, 1914	89	30
Oats	Wheat	Autumn ploughed	88	11
Peas	Summer-fallow	Ploughed June, 1914	32	00
			Tons.	Lb.
Hay	Oats and barley	Sown with preceding crop	1	1,000
Corn for fodder	Roots	Spring ploughed	8	1,076
			Bush.	Lb.
Turnips	Corn and potatoes	Spring ploughed	422	43
Potatoes (early)	Potatoes and roots	Spring ploughed	197	00
Potatoes (late)	Potatoes and roots	Spring ploughed	227	00

COST OF PRODUCTION OF FIELD CROPS.

In computing the cost of production of field crops, the following fixed values have been used. These values are set, in order that the results obtained may be compared from year to year:—

RETURN VALUES.

Wheat (from the machine) ..per lb.	1⅓ cents.
Barley " "	1 cent.
Oats " "	1 cent.
Peas " "	1½ cents.
Mixed hay ..per ton.	$10 00
Oat straw .. "	2 00
Barley straw .. "	2 00
Wheat straw .. "	1 00
Pea straw .. "	2 00
Pasture, each horse ..per month.	1 00

COST VALUES.

Rent of land ..per acre.	$ 2 00
Barnyard manure (charged equally over all years of the rotation) ..per ton.	1 00
Seed wheat ..per acre.	1 50
Seed oats .. "	1 00
Seed barley .. "	1 00
(All other seeds are charged at actual cost. Cost of grass seed is charged equally on the years producing grass. Twine charged at actual cost.)	
Machinery ..per acre.	·60
Manual labour ..per hour.	·19
Horse labour (including teamster)—	
Single horse .. "	·27
Two-horse team .. "	·34
Three-horse team .. "	·41
Four-horse team .. "	·48
Threshing (covering work from stook to granary)—	
Wheat ..per bush.	·07
Oats .. "	·04
Barley .. "	·05
Peas .. "	·07

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COST OF PRODUCING WHEAT ON ROTATION "A."

Year 4.—Continuous Wheat.

Number of acres, 1.

Preceding crops, wheat.	
Rent of land at $2 per acre	$2 00
Ploughing in spring, 3¼ hours, 4-horse team at 48 cents per hour	1 56
Packing, 7/12 hours, 2-horse team at 34 cents per hour	20
Harrowing, ⅔ hours, 4-horse team at 48 cents per hour	32
Seed, 1⅞ bushels at 85 cents per bushel	1 49
Sowing, 1 hour, 4-horse team at 48 cents per hour	48
Packing, 7/12 hours, 2-horse team at 34 cents per hour	20
Cutting, 1¼ hours, 4-horse team at 48 cents per hour	60
Twine, at 30 cents per acre	30
Use of machinery, at 60 cents per acre	60
Stooking, 1 hour manual labour at 19 cents per hour	19
Threshing, 31 bushels 55 pounds at 7 cents per bushel	2 23
Total cost of produce (31 bushels, 55 pounds grain), 6,255 pounds straw)	$10 17

Total yield of grain per acre, 31 bushels, 55 pounds.
Cost per acre, $10.17.
Cost per bushel, 32 cents.

COST OF PRODUCING WHEAT ON ROTATION "C."

Year 2.—Wheat after Summer-fallow.

Number of acres, 1½.

Preceding crops—Summer-fallow.	
Rent of land at $2 per acre	$ 3 00
Cultivating, 11/12 hours, 4-horse team at 48 cents per hour	44
Floating, 1 hour, 4-horse team at 48 cents per hour	48
Seed 2⅝ bushels at 85 cents per bushel	2 23
Sowing, 1½ hours, 2-horse team at 34 cents per hour	51
Packing, 7/12 hours, 2-horse team at 34 cents per hour	20
Cutting, 1 hour, 4-horse team at 48 cents per hour	48
Twine, 30 cents per acre	45
Use of machinery, 60 cents per acre	90
Stooking, 2⅔ hours manual labour at 19 cents per hour	41
Threshing, 60 bushels at 7 cents per bushel	4 20
Total cost of produce (60 bushels grain, 6,400 pounds straw)	$13 30

Total yield of grain from 1½ acres, 60 bushels.
Yield per acre, 40 bushels.
Cost per acre, $8.87.
Cost per bushel, 22 cents.

Year 3.—Wheat after Wheat.

Number of acres, 1½.

Preceding crops—Summer-fallow, wheat.	
Rent of land at $2 per acre	$ 3 00
Ploughing in fall, 4 7/12 hours, 4-horse team at 48 cents per hour	2 20
Packing, ⅝ hour, 2-horse team at 34 cents per hour	28
Harrowing, ⅔ hours, 4-horse team at 48 cents per hour	32
Cultivating, ¾ hours, 4 horse team at 48 cents per hour	36
Cultivating in spring, 11/12 hours, 4-horse team at 48 cents per hour	44
Floating, 1 hour, 4-horse team at 48 cents per hour	48
Seed, 2⅝ bushels at 85 cents per bushel	2 23
Sowing, 1½ hours, 2-horse team at 34 cents per hour	51
Packing, 7/12 hours, 2-horse team at 34 cents per hour	20
Cutting, 1 hour, 4-horse team at 48 cents per hour	48
Twine, at 30 cents per acre	45
Use of machinery, at 60 cents per acre	90
Stooking, 2⅓ hours manual labour at 19 cents per hour	44
Threshing, 50 bushels 44 pounds, at 7 cents per bushel	3 55
Total cost of produce (50 bushels, 44 pounds grain), (6,416 pounds straw)	$15 84

Total yield of grain from 1½ acres—50 bushels, 44 pounds.
Yield per acre, 33 bushels, 37 pounds.
Cost per acre, $10.56.
Cost per bushel, 31 cents.

COST OF PRODUCING WHEAT ON ROTATION "J."

Year 2.—Wheat after Summer-fallow.

Number of acres, 2⅛

Preceding crops, Summer-fallow.

Rent of land, at $2 per acre	$ 4 40
Harrowing, ⅝ hours, 4-horse team at 48 cents per hour	36
Seed, 3 17/20 bushels at 85 cents per bushel	3 22
Sowing, 1 7/12 hours, 4-horse team at 48 cents per hour	76
Packing, 1¼ hours, 2-horse team at 34 cents per hour	40
Cutting, 1⅝ hours, 4-horse team at 48 cents per hour	80
Twine, at 30 cents per acre	66
Use of machinery, at 60 cents per acre	1 32
Stooking, 3¾ hours manual labour at 19 cents per hour	71
Threshing, 105 bushels, 40 pounds, at 7 cents per bushel	7 40
Total cost of produce (105 bushels grain), (9,595 pounds straw)	$20 03

Total yield of grain from 2⅛ acres, 105 bushels, 40 pounds.
Yield per acre, 48 bushels, 1 pound.
Cost per acre, $9.10.
Cost per bushel, 10 cents.

Year 3.—Wheat after Wheat.

Number of acres, 2⅛.

Preceding crops, Summer-fallow, wheat.

Rent of land, at $2 per acre	$ 4 40
Ploughing in fall, 5 hours, 4-horse team at 48 cents per hour	2 40
Harrowing, ⅝ hours, 4-horse team at 48 cents per hour	40
Packing, 1 hour, 2-horse team at 34 cents per hour	34
Cultivating, 1 5/12 hours, 4-horse team at 48 cents per hour	68
Harrowing in spring, ⅝ hours, 4-horse team at 48 cents per hour	40
Seed, 3 17/20 bushels at 85 cents per bushel	3 22
Sowing, 1½ hours, 4-horse team at 48 cents per hour	72
Packing, ⅝ hours, 2-horse team, at 34 cents per hour	28
Cutting, 1⅝ hours, 4-horse team at 48 cents per hour	88
Twine, at 30 cents per acre	66
Use of machinery at 60 cents per hour	1 32
Stooking, 4 hours manual labour at 19 cents per hour	76
Threshing, 90 bushels, 5 pounds, at 7 cents per bushel	6 31
Total cost of produce (90 bushels, 5 pounds grain). (9,525 pounds straw)	$22 77

Total yield of grain from 2⅛ acre— 90 bushels, 5 pounds.
Yield per acre, 40 bushels, 57 pounds.
Cost per acre, $10.35.
Cost per bushel, 25 cents.

COST OF PRODUCING WHEAT ON ROTATION "P."

Year 2.—Wheat after Summer-fallow.

Number of acres, 1½.

Preceding crops, Summer-fallow.

Rent of land at $2 per acre	$ 3 00
Cultivating, 1 1/12 hours, 4-horse team at 48 cents per hour	44
Harrowing, 5/12 hours, 4-horse team at 48 cents per hour	20
Seed, 2⅝ bushels at 85 cents per bushel	2 23
Sowing, 1½ hours, 2-horse team at 34 cents per hour	51
Packing, 1 1/12 hours, 2-horse team at 34 cents per hour	31
Cutting, 1⅛ hours, 4-horse team at 48 cents per hour	56
Twine, at 30 cents per acre	45
Use of machinery, at 60 cents per acre	90
Stooking, 1⅝ hours manual labour at 19 cents per hour	32
Threshing, 58 bushels, 45 pounds, at 7 cents per bushel	4 11
Total cost of produce (58 bushels, 45 pounds grain), (6,675 pounds straw)	$13 03

Total yield from 1½ acres—58 bushels, 45 pounds.
Yield per acre, 39 bushels, 10 pounds.
Cost per acre, $8.69.
Cost per bushel, 22 cents.

Year 3.—Wheat after Wheat.

Number of acres, 1½.

Preceding crops, Summer-fallow, wheat.

Rent of land at $2 per acre	$ 3 00
Ploughing in fall, 3½ hours, 4-horse team at 48 cents per hour	1 60
Harrowing, ¾ hours, 4-horse team at 48 cents per hour	36
Packing, 1 hour, 2-horse team at 34 cents per hour	34
Cultivating, 1⅛ hours, 4-horse team at 48 cents per hour	56
Harrowing in spring, ½ hour, 4-horse team at 48 cents per hour	24
Seed, 2⅝ bushels at 85 cents per bushel	2 23
Sowing, 1½ hours, 2-horse team at 34 cents per hour	51
Packing, ⅝ hours, 2-horse team at 34 cents per hour	28
Cutting, 1¾ hours, 2-horse team at 34 cents per hour	59
Twine, at 30 cents per acre	45
Use of machinery, at 60 cents per acre	90
Stooking, 1½ hours manual labour at 19 cents per hour	28
Threshing, 51 bushels, 20 pounds, at 7 cents per bushel	3 59
Total cost of produce (51 bushels, 20 pounds grain), (5,030 pounds of straw)	$14 93

Total yield of grain from 1½ acres—51 bushels, 20 pounds.
Yield per acre, 34 bushels, 13 pounds.
Cost per acre, $9.95.
Cost per bushel, 29 cents.

COST OF PRODUCING WHEAT ON ROTATION "R."

Year 3.—Wheat after Peas.

Number of acres, 2½.

Preceding crops, Summer-fallow, peas.

Rent of land, at $2 per acre	$ 4 67
Ploughing in spring, 5½ hours, 4-horse team at 40 cents per hour	2 64
Packing, ⅝ hours, 2-horse team at 34 cents per hour	28
Harrowing, 1 hour, 4-horse team at 48 cents per hour	48
Share of manure at rate of 7½ tons per acre, at $1 per ton	1 94
Seed, 4½ bushels at 85 cents per bushel	3 47
Sowing, 1¾ hours, 4-horse team at 48 cents per hour	84
Packing, 1 hour, 2-horse team at 34 cents per hour	34
Harrowing, ⅝ hours, 2-horse team at 34 cents per hour	28
Cutting, 2 hours, 4-horse team at 48 cents per hour	96
Twine, at 30 cents per acre	70
Use of machinery, at 60 cents per acre	1 40
Stooking, 7 hours manual labour at 19 cents per hour	1 33
Threshing, 115 bushels, 40 pounds, at 7 cents per bushel	8 10
Total cost of produce (115 bushels, 40 pounds grain), (12,090 pounds straw)	$27 43

Total yield of grain from 2½ acres—115 bushels, 40 pounds.
Yield per acre, 49 bushels, 33 pounds.
Cost per acre, $11.75.
Cost per bushel, 23·7 cents.

Year 6.—Wheat after Summer-fallow.

Number of acres, 2½.

Preceding crops, Summer-fallow, wheat, oats, summer-fallow.

Rent of land, at $2 per acre	$ 4 67
Harrowing in spring, 7½ hours, 4-horse team at 48 cents per hour	28
Seed, 4½ bushels at 85 cents per bushel	3 47
Sowing, 1¾ hours, 4-horse team at 48 cents per hour	80
Packing, 1 hour, 2-horse team at 34 cents per hour	34
Cutting, 2 hours, 4-horse team at 48 cents per hour	96
Twine, at 30 cents per acre	70
Use of machinery, at 60 cents per acre	1 40
Stooking, 6 hours manual labour at 19 cents per hour	1 14
Threshing, 99 bushels at 7 cents per bushel	6 93
Total cost of produce (99 bushels grain), (11,620 pounds straw)	$20 69

Total yield of grain from 2½ acres—99 bushels.
Yield per acre, 42 bushels, 30 pounds.
Cost per acre, $8.87.
Cost per bushel, 21 cents.

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COST OF PRODUCING OATS ON ROTATION "J."

Year 4.—Oats after Wheat.

Number of acres, 2⅛.

Preceding crops: Summer fallow, wheat, wheat.

Rent of land at $2 per acre	$ 4 40
Ploughing in fall, 4 11/12 hours 4-horse team at 48 cents per hour	2 36
Harrowing, ⅝ hour 4-horse team at 48 cents per hour	40
Packing, 1 hour 2-horse team at 34 cents per hour	34
Cultivating, 1 5/12 hours 4-horse team at 48 cents per hour	68
Harrowing in spring, 1¼ hours 4-horse team at 48 cents per hour	60
Seed, 5½ bushels at 50 cents per bushel	2 75
Sowing, 1½ hours 2-horse team at 34 cents per hour	51
Packing, 1 hour 2-horse team at 34 cents per hour	34
Cutting, 1 7/12 hours 4-horse team at 48 cents per hour	76
Twine at 30 cents per acre	66
Use of machinery at 60 cents per acre	1 32
Stooking, 5 hours manual labour at 19 cents per hour	95
Threshing, 189 bushels 14 pounds at 4 cents per bushel	7 58
Total cost of produce (189 bushels 14 pounds grain), (7,905 pounds straw)	$23 65

Total yield of grain from 2⅛ acres, 189 bushels 14 pounds.
Yield per acre, 86 bushels 18 pounds.
Cost per acre, $10.75.
Cost per bushel, 12 cents.

COST OF PRODUCING OATS ON ROTATION "R."

Year 4.—Oats after Wheat.

Number of acres, 2⅛.

Preceding crops: Summer-fallow, peas, wheat.

Rent of land at $2 per acre	$ 4 67
Ploughing in fall (1914), 4 5/12 hours 4-horse team at 48 cents per acre	2 12
Harrowing, 1 hour 4-horse team at 48 cents per hour	48
Cultivating, 1¾ hours 4-horse team at 48 cents per hour	84
Packing, 1⅛ hours 2-horse team at 34 cents per hour	40
Harrowing in spring, ⅝ hour 4-horse team at 48 cents per hour	40
Seed, 5⅝ bushels at 50 cents per hushel	2 92
Sowing, 1¾ hours 2-horse team at 34 cents per hour	59
Packing, ½ hour 2-horse team at 34 cents per hour	17
Cutting, 2 7/12 hours 4-horse team at 48 cents per hour	1 24
Use of machinery at 60 cents per acre	1 40
Twine at 30 cents per acre	70
Stooking, 3⅝ hours manual labour at 19 cents per hour	70
Threshing, 217 bushels 24 pounds at 4 cents per bushel	8 71
Total cost of produce (217 bushels 24 pounds grain), (8,102 pounds straw)	$25 34

Total yield of grain from 2⅛ acres, 217 bushels 24 pounds.
Yield per acre, 93 bushels 11 pounds.
Cost per acre, $10.86.
Cost per bushel, 12 cents.

Year 7.—Oats (seeded down) after Wheat.

Number of acres, 2⅓.

Preceding crops: Summer-fallow, peas, wheat, oats, summer-fallow, wheat.	
Rent of land at $2 per acre	$ 4 67
Ploughing in fall (1914), 4 11/12 hours 4-horse team at 48 cents per hour.	2 36
Harrowing, 1 11/12 hours 4-horse team at 48 cents per hour	52
Packing, 1¾ hours 2-horse team at 34 cents per hour	42
Cultivating, 1½ hours 4-horse team at 48 cents per hour	72
Harrowing in spring, 1½ hours 4-horse team at 48 cents per hour	72
Seed, 5⅝ bushels at 50 cents per bushel	2 92
Sowing, 1¾ hours 2-horse team at 34 cents per hour	59
Packing, ⅝ hour 2-horse team at 34 cents	28
Cutting, 2¼ hours 4-horse team at 48 cents per hour	1 08
Twine at 30 cents per acre	70
Use of machinery at 60 cents per acre	1 40
Stooking, 3⅔ hours manual labour at 19 cents per hour	51
Threshing, 200 bushels at 4 cents per bushel	8 00
Total cost of produce (200 bushels grain), (8,380 pounds straw)	$24 89

Total yield of grain from 2⅓ acres,—200 bushels.
Yield per acre, 85 bushels 4 pounds.
Cost per acre, $10.67.
Cost per bushel, 12 cents.

COST OF PRODUCING BARLEY ON ROTATION "P."

Year 6.—Barley after Peas.

Number of acres, 1½.

Preceding crops: Summer-fallow, wheat, wheat, summer-fallow, peas.	
Rent of land at $2 per acre	$ 3 00
Harrowing, 1 hour 4-horse team at 48 cents per hour	48
Share of manure at rate of 15 tons per acre at $1 per ton	2 81
Seed, 3 bushels at 50 cents per bushel	1 50
Sowing, 1½ hours 2-horse team at 34 cents per hour	51
Packing, ⅝ hour 2-horse team at 34 cents per hour	28
Cutting, 1⅔ hours 4-horse team at 48 cents per hour	56
Twine at 30 cents per acre	45
Use of machinery at 60 cents per acre	90
Stooking, 2⅔ hours manual labour at 19 cents per hour	44
Threshing, 70 bushels 46 pounds at 5 cents per bushel	3 54
Total cost of produce (70 bushels 46 pounds grain), (5,624 pounds straw)	$14 47

Total yield of grain from 1½ acres, 70 bushels 46 pounds.
Yield per acre, 47 bushels 15 pounds.
Cost per acre, $9.65.
Cost per bushel, 20·3 cents.

COST OF PRODUCING PEAS ON ROTATION "R."

Year 2.—Peas after Summer-fallow.

Number of acres, 2⅔.

Preceding crops: Summer-fallow.	
Rent of land at $2 per acre	$ 4 67
Cultivating, 1 hour 2-horse team at 34 per hour	34
Harrowing, 7½ hour 4-horse team at 48 cents per hour	28
Share of manure at rate of 15 tons per acre at $1 per ton	3 89
Seed, 5⅝ bushels at $1.35 per bushel	7 87
Sowing, 1⅝ hours 2-horse team at 34 cents per hour	59
Packing, ⅝ hour 2-horse team at 34 cents per hour	28
Cutting, 6½ hours 2-horse team at 34 cents per hour	2 21
Coiling, 13 hours manual labour at 19 cents per hour	2 47
Use of machinery at 60 cents per acre	1 40
Threshing, 75 bushels at 7 cents per bushel	5 25
Total cost of produce (75 bushels grain), (9,110 pounds straw)	$29 25

Total yield of grain from 2⅔ acres, 75 bushels.
Yield per acre, 34 bushels 8 pounds.
Cost per acre, $12.53.
Cost per bushel, 39 cents.

COST OF PRODUCING PEAS ON ROTATION "P."

Year 5.—Peas after Summer-fallow.

Number of acres, 1½.

Preceding crops: Summer-fallow, wheat, wheat, summer-fallow.	
Rent of land at $2 per acre	$ 3 00
Harrowing, 1⅓ hour 4-horse team at 48 cents per hour	44
Share of manure at rate of 15 tons per acre at $1 per ton	2 81
Seed, 3¾ bushels at $1.35 per bushel	5 06
Sowing, 1½ hours 2-horse team at 34 cents per hour	51
Packing, ⅝ hour 2-horse team at 34 cents per hour	28
Cutting, 5 hours 2-horse team at 34 cents per hour	1 70
Coiling, 15 hours manual labour at 19 cents per hour	2 85
Use of machinery at 60 cents per acre	90
Threshing, 47 bushels 50 pounds at 7 cents per bushel	3 36
Total cost of produce (47 bushels 50 pounds grain), (7,325 pounds straw)	$20 91

Total yield of grain from 1½ acres, 47 bushels 50 pounds.
Yield per acre, 31 bushels 53 pounds.
Cost per acre, $13.94.
Cost per bushel, 43·7 cents.

SUMMARY of Cost of Producing Field Crops, 1915.

Crop.	Area.	Yield per acre.		Cost to produce.		
	Acres.	Tons.	Bushels.	Per acre. $ c.	Per ton. $ c.	Per Bush. Cents.
Wheat	16·00	.....	39·99	9·82	.....	25·2
Oats	6·86	.....	88·32	10·76	.....	12·00
Barley	1·5	.....	47·31	9·65	.....	20·3
Peas	3·83	.....	33·00	13·22	.....	41.00
Hay	5·85	1·48	.....	5·46	3·71	.....

ROTATION

Rotation Year.	Crops. 1914.	Crops. 1915.	Area.	Items of Expense: Rent and manure.	Seed, twine and use of machinery.	Manual labour. Hours.	Manual labour. Cost.	Horse labour (including teamster.) Hours. Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
			Ac.	$ c.	$ c.	No.	$ c.	No.	No.	No.	No.	No.
	Wheat	Wheat	1	2 00	2 40	1·00	0 19	.....	1·17	.....	6·17	....
	Aggregate		1	2 00	2 40	1·00	0 19	.....	1·17	.....	6·17	.....
	Average per acre		.....	2 00	2 40	1·00	0 19	.....	1·17	.....	6·17	.....

ROTATION

1st	Wheat	Summer-fallow.	1·5	3 00	0 90	.....	.....	.....	·83	.....	7·83	.....
2nd	Summer-fallow.	Wheat	1·5	3 00	3 60	2·17	0 41	.....	2·08	.....	2·92	.....
3rd	Wheat	Wheat	1·5	3 00	3 60	2·33	0 44	.....	2·92	.....	8·92	.....
	Aggregate		4·5	9 00	8 10	4	0 85	.....	5·83	.....	19·66	.....
	Average per acre		.....	2 00	1 80	1·00	0 19	.....	1·30	.....	4·37	.....

ROTATION

1st	Pasture	Summer-fallow.	2·2	4 40	1 32	....	.....	.....	....	6·00	15·00	...
2nd	Summer-fallow.	Wheat	2·2	4 40	5 28	3·75	0 71	.....	1·17	.....	4·00	.....
3rd	Wheat	Wheat	2·2	4 40	5 28	4·00	0 76	.....	1·83	.....	11·00	.....
4th	Wheat	Oats	2·2	4 40	4 18	5·00	0 95	.....	2·50	.....	12·00	.....
5th	Oats	Hay	2·0	4 00	4 12	1·25	0 24	.....	5·66	.....	.....	.....
6th	Hay	Pasture	2·2	4 40	3 22	...	.....	.....	.....	.....	.....	.....
	Aggregate		13·0	26 00	23 40	14·00	2 66	.....	11·16	6·00	42·00	.....
	Average per acre		.....	2 00	1 80	1·08	0 20	.....	0·86	0·46	3·23	....

ROTATION

1st	Pasture	Summer-fallow.	2·33	4 67	1 40	.....	.....	.....	1·00	10·50	13·17	.....
2nd	Summer-fallow.	Peas	2 33	8 56	9 27	13·00	2 47	.....	10·09	.....	0·58	.....
3rd	Peas	Wheat	2·33	6 61	5 60	7·00	1 33	.....	2·66	.....	10·25	.....
4th	Wheat	Oats	2·33	4 67	4 43	3·66	0 70	.....	3·42	.....	10·58	.....
5th	Oats	Summer-fallow.	2·33	4 67	1 40	.....	1 14	.....	1·25	.....	11·08	.....
6th	Summer-fallow.	Wheat	2·33	4 67	5 60	6·00	0 70	.....	1·00	.....	4·25	.....
7th	Wheat	Oats	2·33	4 67	4 43	3·66	1 14	.....	3·83	.....	11·25	.....
8th	Oats	Hay	2·33	4 67	4 81	6·00	.....	.....	6·92	.....	.....	.....
9th	Hay	Pasture	2·33	4 67	4 81	.....	.....	.....	....	.....	.....	.....
	Aggregate		21·00	47 86	41 75	39·32	7 48	.....	30·50	10·50	61·16	.....
	Average per acre		.....	2 28	1 99	1·87	0 36	.....	1·46	0·50	2·91	.....

"A" (wheat continuously).

in raising Crop.							Particulars of Crop.						
							Weight.						
Value of horse labour.	Cost of threshing.	Total cost.	Cost of 1 acre.	Cost for 1 bushel.	Cost for 1 ton.	Height of stubble.	Grain.	Straw.	Hay.	Hoed crop.	Total value.	Value of crop per acre.	Profit or loss per acre.
$ c.	$ c.	$ c.	$ c.	Cts.	$ c.	Ins.	Lb.	Lb.	Lb.	Lb.	$ c.	$ c.	$ c.
3 35	2 24	10 18	10 18	31·75	..	8	1,915	6,255	.....	.....	28 66	28 66	18 48
3 35	2 24	10 18	.....	.....	.....	.....	.....	.....	.....	.....	28 66	.....	.....
3 35	2 24	.....	10 18	.....	.....	.....	.....	.....	.....	.....	.....	28 66	18 48

"C." (three years' duration).

4 04	...	7 94	5 29	.....	.....	.....	.....	.....	.....	.....	.....	.....	−5 29
2 11	4 20	13 32	8 88	22·2	.....	.....	3,600	6,400	.....	.....	51 20	34 13	25 00
5 27	3 55	15 86	10 57	31·25	.....	.....	3,044	5,416	.....	.....	43 30	28 87	18 30
11 42	7 75	37 12	.....	.....	.....	.....	.....	.....	.....	.....	94 50	.....	.....
2 54	1 72	.....	8 25	.....	.....	.....	.....	.....	.....	.....	.....	21 00	12 75

"J." (six years' duration).

9 66	.....	15 38	6 99	.....	.....	.....	.....	.....	.....	.....	.....	.....	−6 99
2 32	7 40	20 10	9 14	19·0	.....	.....	6,340	9,595	.....	.....	89 33	40 60	31 46
5 90	6 30	22 64	10 29	25·17	.....	.....	5,405	9,525	.....	.....	76 82	34 92	24 63
6 61	7 58	23 72	10 78	12·5	.....	.....	6,340	7,905	.....	.....	71 30	32 41	21 63
1 93	..	10 29	5 14	....	.....	.....	.....	.....	5,160	.....	25 80	12 90	7 76
..	..	7 62	3 46	....	.....	.....	.....	..	.....	.....	7 63	3 46	.....
26 42	21 28	99 76	.....	....	.....	.....	.....	.....	.....	.....	270 88	.....	.....
2 03	1 64	.....	7 67	.....	....	.....	.....	.....	.....	.....	.....	20 83	13 16

"R." (nine years' duration).

10 96	.....	17 03	7 30	.....	.....	.....	.....	.....	.....	.....	.....	.....	−7 30
3 71	5 25	29 20	12 51	39·0	.....	.....	4,500	9,110	.....	.....	76 61	32 83	20 32
5 83	8 10	27 47	11 77	23·7	.....	.....	6,940	12,090	.....	.....	98 58	42 25	30 48
6 24	8 71	24 75	10 60	9·66	.....	.....	7,402	8,102	.....	.....	82 12	35 19	24 59
5 74	.....	11 81	5 06	.	.....	.....	.....	.....	.....	.....	.....	.....	−5 06
2 38	6 93	20 72	8 88	21·0	.....	....	5,940	11,620	.....	.....	85 01	36 43	27 55
6 70	8 00	24 50	10 50	12·25	.....	....	6,800	8,380	.....	.....	76 38	32 73	22 23
2 35	.....	12 97	5 56	.....	3 24	.....	.....	.....	8,010	.....	40 05	17 16	11 60
.....	...	9 48	4 06	.....	.....	.....	.....	.....	.....	.....	7 00	3 00	−1 06
43 91	36 99	177 93	.....	.....	.....	.....	.....	.....	.....	.....	465 75	.....	.....
2 09	1 76	....	8 47	.....	.....	....	.....	.....	.....	.....	.....	22 18	13 71

ROTATION

Rotation Year.	Crops.		Area.	Items of Expense								
				Rent and manure.	Seed, twine and use of machinery.	Manual labour.		Horse labour (including teamster.)				
								Hours.				
						Hours.	Cost.	Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
	1914.	1916.	Ac.	$ c.	$ c.	No.	$ c.	No.	No.	No.	No.	No.
1st...	Pasture.....	Summer-fallow.	1·5	3 00	0 90	.....	.....	.....	0·83	8·00	7·17	.....
2nd...	Summer-fallow.	Wheat.....	1·5	3 00	3 60	1·66	0 32	.....	2·42	.....	2·50	.....
3rd...	Wheat.....	Wheat.....	1·5	3 00	3 60	1·50	0 28	.....	5·08	.....	5·75	.....
4th...	Wheat.....	Summer-fallow.	1·37	2 75	0 82	.....	.....	.....	0·83	2·00	6·92	.....
5th...	Summer-fallow.	Peas.....	1·5	5 81	5 96	15·00	2 85	.....	7·33	.....	0·93	.....
6th...	Peas.....	Barley.....	1·5	5 81	2 85	2·33	0 44	.....	2·33	.....	2·17	.....
7th...	Barley.....	Hay.....	1·5	3 00	3 09	2·83	0 54	.....	5·59	.....	.....	.....
8th...	Hay.....	Pasture.....	1·5	3 00	2 19	.....	.....	.....	.....	.....	.....	.....
	Aggregate.....		11·87	29 37	23 01	23·32	4 43	.....	24·41	10·00	25·44	.....
	Aggregate per acre.....		.....	2 47	1 92	2·00	0 37	.....	2·05	0·84	2·14	.....

* Six months pasture for one horse.

"P." (eight years' duration).

in raising Crop.							Particulars of Crop.						
							Weight.						
Value of horse labour.	Cost of threshing.	Total cost.	Cost of 1 acre.	Cost for 1 bushel.	Cost for 1 ton.	Height of stubble.	Grain.	Straw.	Hay.	Hoed crop.	Total value.	Value of crop per acre.	Profit or loss per acre.
$ c.	$ c.	$ c.	$ c.	Cts.	$ c.	Ins.	Lb.	Lb.	Lb.	Lb.	$ c.	$ c.	$ c.
7 00	.....	10 90	7 27	.....	.....	.....	.....	.....	.....	.....	.....	.....	−7 27
2 02	4 11	13 05	8 70	22·0	.....	.....	3,525	6,675	.....	.....	50 34	33 56	24 86
4 49	3 59	14 96	9 97	29·14	.....	.....	3,080	5,030	.....	.....	43 58	29 05	19 08
4 54	.....	8 11	5 40	.....	.....	.....	.....	.....	.....	.....	.....	.....	−5 40
2 93	3 35	20 90	13 93	44·0	.....	.....	2,870	7,325	.....	.....	50 37	33 58	19 65
1 83	3 35	14 48	9 65	20·5	.....	.....	3,406	5,624	.....	.....	39 68	26 45	16 80
1 90	.....	8 53	5 69	.....	3 91	.....	.....	.....	4,360	.....	21 80	14 53	8 84
.....	.....	5 19	3 46	.....	.....	.....	.....	.....	.....	.....	*6 00	4 00	0 54
24 71	14 60	96 12	.....	.....	.....	.....	.....	.....	.....	.....	211 77	.....	.....
2 08	1 23	.....	8 01	.....	.....	.....	.....	.....	.....	.....	.....	17 63	9 63

CROP ROTATIONS.

The rotations under test on this Station are, for the most part, very simple, and do not include intertilled crops of any kind. Rotation "C" is usually followed by the better class of farmers at the present time. Rotation "J" is the first step in the direction of a permanent system of crop rotation, as it includes grain, hay, and pasture crops. A summer-fallow year, to break up the pasture land and to conserve the moisture for succeeding crops, has also been included. It is planned to test this rotation on a larger scale, using 20-acre fields.

Rotations "R" and "P" include grain, hay, and pasture. Both rotations have two summer-fallow years. Field peas have also been added to the commonly grown grain crops.

In all rotations, where seeding-down is practised, the following mixture has been used,—10 pounds of western rye grass, 3 pounds of red clover, and 3 pounds of alfalfa. The seed is sown with a nurse crop.

In the crop rotations, fixed values are used for wages and products. These constant values are necessary in order to allow a comparison of the different rotations for a period of years. The values used will be found in the table on the cost of production.

PLOT "A"—CONTINUOUS WHEAT.

This 1-acre field has grown wheat for four successive seasons. Due to some cause, as yet unknown, small patches were killed out early in the season; this difficulty was not noticed on any other field. Owing to unusual supply of moisture, the net profit from this system was exceptionally high.

ROTATION "C" (THREE YEARS' DURATION).

First year.—Summer-fallow.

Second year.—Wheat.

Third year.—Wheat.

This is the three-year rotation, i.e., two crops of grain, and then summer-fallow, practised by the better class of farmers in northwestern Saskatchewan. By thorough tillage and careful selection of clean seed, profitable crops can be grown while the land is new and fertile. Continuous tillage, however, must eventually destroy the fibre, and owing to the strong winds experienced, soil drifting will result. During the past season the fields on this rotation suffered more severely from this cause than any others.

The average net profit for the past four years, from this rotation, has amounted to $5.46 per acre.

ROTATION "J" (SIX YEARS' DURATION).

First-year.—Summer-fallow.

Second year.—Wheat.

Third year.—Wheat.

Fourth year.—Oats, seeded down with western rye grass, 10 pounds; red clover, 3 pounds; alfalfa, 3 pounds per acre.

Fifth year.—Hay.

Sixth year.—Pasture.

Rotation "J" incorporates the two classes of crops necessary for mixed farming, i.e., grain and grass crops. One-half the land (each year) produces a crop of grain; one-third is down to grass; one-sixth is bare fallow.

While the profits from the hay are not large, and the pasture barely pays expenses, yet the increased profits from the succeeding grain crops, together with a decreased cost of keeping weeds under control, has made this rotation unusually profitable.

The average net profit for the past four years has amounted to $7.88 per acre.

SCOTT.

ROTATION "P" (EIGHT YEARS' DURATION).

First year.—Summer-fallow.

Second year.—Wheat.

Third year.—Wheat.

Fourth year.—Summer-fallow.

Fifth year.—Peas, manured 15 tons per acre.

Sixth year.—Barley, seeded down with western rye grass, red clover, and alfalfa.

Seventh year.—Hay.

Eighth year.—Pasture.

This mixed farming rotation, while in advance of the immediate requirements of the district, is necessary in order to ascertain the possibilities of utilizing a large part of the farm in the production of coarse grain and grass crops for feeding live stock. The average profit from this rotation for the past four years has been $5.79 per acre.

ROTATION "R" (NINE YEARS' DURATION).

First year.—Summer-fallow.

Second year.—Peas, manured 15 tons per acre.

Third year.—Wheat.

Fourth year.—Oats.

Fifth year.—Summer-fallow

Sixth year.—Wheat.

Seventh year.—Oats, seeded down with western rye grass, red clover, and alfalfa.

Eighth year.—Hay.

Ninth year.—Pasture.

The objection might be raised, to this rotation, that the farm would be divided up into too many fields, and the cost of fencing would be too high. The returns realized, however, from this experiment, would indicate a fairly profitable arrangement of crops. It will be noted that more than half the farm is producing grain; a little less than one-quarter is down to grass, and an equal amount is fallowed. Outstanding features in connection with this past season's operations were, the excellent crop of wheat following peas, and the satisfactory hay crop harvested.

The average profit per acre from this rotation has amounted to $7.57 for the past four years.

SUMMARY OF ROTATION EXPERIMENTS.

Comparative Costs, Returns, and Net Profits per Acre.

Rotation.	Total cost to operate, 1915.	Value of Returns, 1915.	Net Profit, 1915.	Net Profit, average for 4 years.
	$ cts.	$ cts.	$ cts.	$ cts.
"A" (continuous wheat)	10 18	28 66	18 48	9 73
"C" (three years' duration)	8 25	21 00	12 75	5 46
"J" (six years' duration)	7 67	20 83	13 16	7 88
"P" (eight years' duration)	8 01	17 63	9 63	5 79
"R" (nine years' duration)	8 47	22 18	13 71	7 59

OTHER CROP MANAGEMENT EXPERIMENTS.

RATES OF SEEDING.

Rates of Seeding Wheat on Breaking.

Variety.	Quantity of seed per acre.	Number of days maturing.	Yield per acre, 1915.	Average Yield per acre, 4 years.
	Bush.		Bush. Lb.	Bush. Lb.
Marquis	¾	129	36 00	25 00
"	1¼	129	37 50	26 20
"	1¾	129	40 50	30 5
"	2¼	129	34 20	27 20
"	2¾	129	32 40	24 40
Prelude	¾	118	18 30	— —
"	1¼	118	15 40	— —
"	1¾	118	14 30	— —
"	2¼	117	13 30	— —
"	2¾	117	12 20	— —

The land was broken in June, 1914, and cultivated several times during the summer. The preparatory treatment in the spring consisted of floating and harrowing. The seed was sown on April 10.

Rates of Seeding Oats on Breaking.

Variety.	Quantity of seed per acre.	Number of days maturing.	Yield per acre, 1915.	Average Yield per acre, 4 years.
	Bush.		Bush. Lb.	Bush. Lb.
Banner	1	117	86 26	92 9
"	1½	117	91 26	89 18
"	2	117	100 00	89 29
"	2½	117	92 12	82 11
"	3	117	95 15	83 9

The oats were sown on May 1, on well cultivated new land. It will be noted, that using the seed at the rate of 2 bushels per acre gave the heaviest yields in 1915, whereas one bushel per acre has given the highest average yield for the past four years. This variation may be due to a more abundant supply of moisture during the past season.

DATES OF SEEDING.

Dates of Seeding Marquis Wheat on Breaking.

Dates of Seeding.	Yield per acre, 1913.	Yield per acre, 1914.	Yield per acre, 1915.	Average Yield per acre, 3 years.
	Bush. Lb.	Bush. Lb.	Bush. Lb.	Bush. Lb.
April 10	20 20	— —	37 50	*28 50
" 17	28 20	18 40	39 00	28 30
" 24	29 20	18 20	37 40	28 26
May 1	35 00	19 20	41 40	31 33
" 8	33 00	21 20	37 00	31 00

*Only two-year average available.

Uniform preparatory treatment was given the plots, and Marquis wheat was used at the rate of 1¾ bushels per acre. In 1913 and 1914 the tests were conducted on summer-fallow. In 1915 the grain was sown on well-worked new land.

Dates of Seeding Banner Oats on Breaking.

Dates of Seeding.	Number of days maturing.	Yield per acre, 1915.
		Bush. Lb.
April 10	130	86 16
" 17	124	87 22
" 24	116	91 6
May 1	117	86 16
" 8	111	84 24

The Banner oats were used at the rate of 2½ bushels per acre, and sown on breaking.

Dates of Seeding Common Flax on Breaking.

Dates of Seeding.	Number of days maturing.	Yield per acre, 1915.
		Bush. Lb.
April 10	145	16 34
" 17	138	18 32
" 24	132	19 36
May 1	125	18 52
" 8	118	19 16

The flax seed was used at the rate of 30 pounds per acre.

SCOTT.

SOIL MANAGEMENT EXPERIMENTS.

PRAIRIE BREAKING.

This experiment is of particular interest to the settlers in the newer districts. The possibilities of getting immediate returns by breaking up new land and cropping the same year appeals to many newcomers. The results secured on the Station would not warrant recommending this method.

The question of deep breaking *versus* breaking shallow and backsetting, is receiving considerable attention. It would appear that the kind of grass, and weather conditions prevailing, should be the deciding factors in determining whether backsetting is necessary. If there is an abundance of grass with running root-stocks, or if the season is wet, backsetting will be found profitable. If, on the other hand, grasses with the root-stocks are not present and the season is dry, only breaking may be necessary to destroy the grass. In fact, where the land is well broken and the grass destroyed, and moisture conserved by thorough cultivation, equal, or heavier crops can be raised by the deep breaking method.

The practice of sowing a second crop on breaking, without ploughing, should be discouraged. Grass, not destroyed by breaking, is usually of a persistent nature and frequently is the native couch grass. Leaving these grasses undisturbed for two years results in their becoming so firmly established that much work is required to keep them under control.

The following table gives the average yields obtained from breaking and cropping the same season. A comparison is also made of the returns secured from the succeeding crops from these plots, and from deep breaking, and breaking and backsetting.

Crop.	Average Yield per acre 3 years.
	Lb.
Green feed (oats and peas), spring breaking	1,650
	Bush. Lb.
Flax, spring breaking	9 34
	Average Yield per acre 2 years.
	Bush. Lb.
Wheat following green feed	17 30
Wheat following flax	20 00
Wheat on deep breaking	26 40
Wheat on shallow breaking, backset	23 20

SUMMER-FALLOWING EXPERIMENT.

Owing to weather conditions that were favourable to good yields, even where poor treatment was afforded, the results from the greater number of tests in summer-fallowing were uniform. An increased yield was noted in the summer-fallows that were ploughed a second time in the autumn of 1914. A difference in yield was also noted in the depths of ploughing experiment. The following table gives the yields secured from the three depths tested:—

SCOTT.

DEPTHS of Ploughing Summer-fallow.

Plot.	Depth of Ploughing.	Yield of Wheat per acre.	Yield of Straw per acre.
		Bush. Lb.	Lb.
1	Ploughed 4 inches deep	31 40	5,580
2	Ploughed 6 inches deep	36 40	6,080
3	Ploughed 8 inches deep	39 20	6,640

SEED-BED PREPARATION FOR WHEAT.

The object of this experiment is to determine the amount of work that can be profitably expended in the preparation of the seed-bed. The work, as outlined in the following table, was done in the spring in preparing summer-fallow land for wheat:—

SEED-BED Preparation for Wheat.

Plot.	Treatment, Spring of 1915.	Yield of Wheat per acre.
		Bush. Lb.
1	Harrowed before seeding	39 20
2	Harrowed twice before seeding, packed after sowing	41 40
3	Harrowed twice, packed before seeding, packed and harrowed after seeding	43 40

SEED-BED PREPARATION FOR OATS ON NEW LAND.

In order to determine the profitableness of increasing the amount of tillage usually given new land, experiments were conducted under field conditions. The land had been broken in June, 1914, and packed and double disced early in the season. During the latter part of the summer the land was again double disced. The field was harrowed with the smoothing harrow early in the spring, then measured off into 5-acre fields. Ligowo oats were sown at the rate of 2½ bushels per acre, on April 30.

The treatment as outlined in the following table, may be considered additional to that usually afforded new land in this district:—

SEED-BED Preparation for Oats.

Field.	Treatment, Spring of 1915.	Yield of Oats per acre.
		Bush. Lb.
1	Harrowed, floated, sown	93 2
2	Harrowed, sown, packed	88 25
3	Harrowed, sown	83 2
4	Harrowed, sown, packed, harrowed when 6 inches high	94 00

The float used is similar in construction to the split-log drag; the packer, the ordinary surface packer; the smoothing harrow, the straight tooth, diamond harrow.

SCOTT.

CULTURAL TESTS ON FALL-PLOUGHED LAND.

An experiment was made with harrowing oats when the crop was 6 inches high. One-half of a field of oats, growing on fall-ploughed land, was harrowed, the remainder was left untouched. The following table gives the yields secured:—

HARROWING Oats when 6 inches high.

Field.	Treatment, Spring of 1915.	Yield of Oats per acre.	
		Bush.	Lb.
1	Harrowed, sown	91	26
2	Harrowed, sown, harrowed when 6 inches high	107	5

The ground was not packed, consequently rather loose, and in harrowing, a number of plants were covered, and some pulled out. The crop received a set back, but this was more than made up for by the vigorous growth throughout the remainder of the season.

SOIL PACKERS

In addition to the usual tests with soil packers, an experiment was conducted under field conditions, to determine whether before or after seeding was the best time to pack for oats. Owing to the abundant supply of moisture in the soil during the growing season, the yields from both treatments were the same.

DEPTHS OF SEEDING EXPERIMENT.

Four plots of wheat were sown on April 17, at the rate of 1¾ bushels per acre, at depths ranging from 1 to 4 inches. The average results obtained during the past four years are also included in the following table:—

DEPTHS of Seeding Wheat on Summer-fallow.

Plot.	Depth of Seeding.	Number of days maturing.	Yield per acre, 1915.		Average Yield per acre, 4 years.	
			Bush.	Lb.	Bush.	Lb.
1	1 inch deep	122	42	40	32	55
2	2 inches deep	122	42	20	33	14
3	3 inches deep	123	41	40	35	19
4	4 inches deep	123	39	00	34	39

It will be noted that the shallower sowing gave the heaviest yield during the past season, whereas sowing 3 inches deep has, for an average of four years, given the best yield. In all probability, the discrepancy in this experiment is due to the more abundant supply of moisture in 1915.

SCOTT.

SEEDING TO GRASSES AND CLOVERS.

The two main objects in view in this experiment are:—

First.—To determine the best crops to precede hay crops.

Second.—To ascertain the best methods to employ in seeding down.

Summer-fallowing appears to be the best preparatory treatment, with a hoed crop fairly satisfactory. Seeding alone has given heavier yields than where a nurse crop was used, but not sufficient to pay for the loss of the grain crop.

The mixture used in these experiments is composed of 10 pounds of western rye grass, and 10 pounds of red clover. The ordinary grain drill is used for sowing. The seed is mixed with the grain when sown with a nurse crop; when sown alone, coarsely cracked wheat is used therewith. The grass mixture and cracked wheat are used in the proportion of 1 part of the former to 3 of the latter. The drill is set at 1 bushel of wheat per acre. The precaution is usually taken of packing the land, both before and after seeding. Packing before seeding makes the seed-bed more compact, and permits a shallower and more uniform depth of seeding. Packing after seeding gives a more even germination.

SEEDING-down Experiment.

Plot.	Treatment, 1914.	Treatment, 1915.	Yield per acre.	
			Tons.	Lb.
1	Summer-fallow	Seeded with wheat	3	1,840
2	Summer-fallow	Seeded alone	3	1,000
3	Mangels	Seeded with wheat	2	200
4	Mangels	Seeded alone	2	1,400
5	Wheat (fall-ploughed)	Seeded with wheat	1	400
6	Wheat "	Seeded alone	1	1,160
7	Wheat "	Seeded with oats (cut green)	1	1,120
8	Wheat " (manured)	Seeded alone	3	120
9	Wheat "	Seeded with wheat	2	—
10	Oats "	Seeded alone	3	600
11	Wheat "	Seeded with wheat	2	520

USE OF BARNYARD MANURE FOR CEREAL CROPS.

Quite a difference of opinion exists as to the profitableness of applying barnyard manure on the new and fertile prairie soils. An experiment with the use of barnyard manure was commenced in 1914. Land that had been broken in 1913, and had grown a crop of wheat in 1914, was selected for the experiment. Four separate sets of plots were measured off, in order to test the value of the manure for turnips, wheat, oats, and barley. Twelve tons per acre were applied with the spreader in the manner, and at such times, as are specified in the following table. In compiling the table, the yields of the cereal crops from the plots receiving similar treatment are placed side by side:—

APPLICATION of Barnyard Manure for Wheat, Barley, and Oats.

Plot.	Application of Manure.	Yield per acre, 1915.					
		Wheat.		Barley.		Oats.	
		Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
1	Applying green manure, in winter, on fall-ploughed land, disced before seeding	38	40	41	32	106	00
2	Applying rotted manure, on fall-ploughed land, after seeding	39	40	38	16	90	10
3	No manure, fall-ploughed	32	00	35	00	90	20
4	Applying rotted manure, ploughed under in autumn	39	40	55	40	101	10
5	Applying rotted manure, ploughed under in spring	40	40	56	12	103	10
6	No manure, disc stubble, fall-ploughed	34	00	41	12	93	10
7	No manure, burn stubble, fall-ploughed	32	00	49	8	100	00

It will be noted that ploughing the manure under gave a heavier yield than top dressing, excepting in plot 1, in the oats. The lower yield from top dressing after seeding is due, in part, to the injury to the crop by the spreader. Discing the stubble before ploughing has increased the yield. This may be accounted for by the more complete connection between the overturned furrow slice and the subsoil, due to the stubble being broken down, and to the granular condition of the soil. This system of cultivation should also increase the capillary action, and hasten the decay of the stubble and plant roots.

Burning the stubble before ploughing will decrease the plant food; by destroying the stubble some weed seeds will be destroyed. The land works down more readily after burning.

FENCING AND BREAKING.

One-half mile of woven wire fencing was erected. The lower 3 feet of the cedar posts were painted three times with creosote. The cost of the treatment, including labour, amounted to 11·7 cents for each post. In order to determine the value of the treatment, every fifteenth post was left untreated.

Fifty acres of new land was broken up. The land on the original farm is now all broken and under cultivation, with 107 acres broken on the land acquired in 1914.

EXPERIMENTAL STATION FOR SOUTHERN ALBERTA, LETHBRIDGE, ALTA.

REPORT OF THE SUPERINTENDENT, W. H. FAIRFIELD, M.S.

CHARACTER OF SEASON.

The season of 1915 will long be remembered as one of the most favourable for all kinds of field crops that has ever been experienced in Southern Alberta. The average yield of all cereals has been very high. In some individual cases the yields have been so extremely large as scarcely to be credited; in fact, a field with a really poor crop was practically unknown. The exceptionally high yields obtained on this Station substantially proved that the season was considerably better than normal. There was more than the usual amount of precipitation during the last few months of 1914 and practically all of this moisture was carried over in the soil to the spring of 1915. In the summer of 1915, particularly during the growing season, ample rain fell at times when it was most needed and the result was the bumper crop, little more than half of which has been shipped at the time of writing, March 31, 1916; in fact, it has not all been threshed. The first work on the land was done on March 31. There was practically no rain in April to interfere with seeding so that it was completed in good season. There were generous rains during May, June, and July so that all field crops made most favourable growth. There was little rain in August and with the consequent high temperatures grain matured rapidly. Hay crops of all kinds did well but the wet weather prevailing during June and July made the curing of the crop very difficult.

Some Weather Observations taken at Lethbrdge Experimental Station, 1915.

Month.	Temperature F.			Total Precipitation.	Total Sunshine.
	Mean.	Highest.	Lowest.		
	°	°	°	Inches.	Hours.
January	17·06	52·0	−26·5	0·50	112·4
February	19·98	47·2	− 4·0	0·94	126·3
March	28·67	67·2	1·8	0·22	164·5
April	49·23	81·9	21·0	0·04	230·3
May	49·99	78·4	28·5	3·03	230·2
June	53·6	79·0	36·0	4·84	225·9
July	58·63	86·5	36·5	3·44	291·4
August	66·53	92·7	45·2	0·96	333·8
September	49·35	80·5	20·0	1·32	161·4
October	47·3	79·0	20·0	0·96	180·2
November	29·33	61·0	− 3·5	0·75	140·8
December	24·8	55·2	−11·5	0·27	96·1
Total for the year	.....	.....	.....	17·27	2,293·3

SUMMER-FALLOW IN SOUTHERN ALBERTA.

The summer-fallow is such an important feature in all field husbandry operations on non-irrigated land in this part of the province that no apology need be offered for repeating what has been said in previous reports.

The great variation in the amount of our rainfall from year to year, and the fact that there have been so many seasons when the precipitation, during the months of May, June, and July, has been scant, demonstrate pretty clearly the necessity of giving careful consideration to the subject. The object of the summer-fallow in Southern Alberta, as has often been pointed out, is to conserve moisture. When properly carried out it helps keep weeds under control, and stimulates the growth of crops by making available plant food, but these points are secondary in importance to the fact that it is possible to store a good portion of the moisture that falls during the summer in the subsoil, and have it on hand to supplement the rainfall that comes the following season when the crop is growing. It has been shown that the wheat plant will send fibrous roots down to a depth of 3½ feet for moisture. Newcomers are sometimes slow in appreciating the importance, in fact the imperative need of the summer-fallow in any rotation of field crops that may be attempted here on non-irrigated land. It is to be hoped that the exceptional results in 1915 may not lead them astray, for the key to successful dry-land farming is the summer-fallow; deep ploughing or the use of the subsurface packer or the disc, etc., are important details but are secondary in importance. The main thing to be borne in mind is that the land must be ploughed before the weeds and grass make any growth, and sufficient cultivation must follow, to prevent all growth of vegetation of no matter what character; for the loss of moisture from the soil by evaporation is trivial compared to what is pumped out by plant growth. The cultivation that is necessary to kill the weeds forms a mulch that prevents evaporation very materially. Where the land is thus kept clean of any growth during the whole season, all the rain that arrives is taken up by the soil, and this becomes thoroughly moistened to a depth of from 5 to 7 feet.

NO IRRIGATION NECESSARY.

The conditions were so favourable on account of the ample supply of moisture that was in the soil and subsoil at the beginning of the season, and the generous rains that came during the time the crops were growing made irrigation unnecessary for general field crops on the irrigated part of the farm. This is the first time in the eight seasons that crops have been grown on the Station that the yield of grain crops has not been improved, at least to some extent, by the application of water. In the fifteen years that the writer has been farming in this district there was only one other season, 1902, when grain crops were not irrigated with benefit. In that year the rainfall was 28 inches. This point is mentioned to emphasize the rather self-evident fact that the season of 1915 was exceptionally favourable and that similar results cannot be expected from haphazard methods of culture, but that systematic dry-farming methods as indicated in the previous paragraph on summer-fallow must be followed up consistently if profitable returns are to be expected on non-irrigated lands.

LETHBRIDGE.

CROP ROTATIONS.

That the results obtained in various years may be comparable, fixed valuations have been established for both labour and product. These valuations will be used from year to year, regardless of fluctuations in rates of wages and values of products.

The following values have been fixed:—

Return Values.

Wheat (from the machine)	per lb.	1⅓ cents.
Barley	"	1 cent.
Oats	"	1 cent.
Peas	"	1½ cents.
Flax	"	3 cents.
Timothy hay	per ton	$10 00
Red clover hay	"	10 00
Alfalfa hay	"	12 00
Brome grass hay	"	10 00
Western rye grass hay	"	10 00
Mixed hay	"	10 00
Green hay	"	10 00
Oat straw	"	2 00
Flax straw	"	2 00
Barley straw	"	2 00
Wheat straw	"	1 00
Pea straw	"	2 00
Dry corn stalks	"	5 00
Corn ensilage	"	3 00
Mangels and turnips	"	3 00
Sugar beets	"	4 00
Pasture, each horse	per month.	1 00
" cow	"	1 00
" sheep	"	25

Cost Values.

Rent	per acre.	$ 2 00
Barnyard manure spread on fields (charged equally over all years of rotation)	per ton.	1 00
Seed wheat	per acre.	1 50
Seed oats	"	1 00
Seed barley	"	1 00
(All other seeds to be charged at actual cost. Cost of grass seed to be charged equally on the years producing grass. Twine charged at actual cost.)		
Machinery	per acre.	60
Manual labour	per hour.	19
Horse labour (including teamster)—		
Single-horse	"	27
Two-horse team	"	34
Three-horse team	"	41
Four-horse team	"	48
Additional horses	each hour.	07
Threshing (covering work from stook to granary)—		
Wheat	per bush	07
Oats	"	04
Barley	"	05
Flax	"	12
Peas	"	07

Crop Rotations (non-irrigated).

This is the fifth season for the following rotations:—

rotation "A."

Wheat continuously.

rotation "B" (two years' duration).

First year.—Wheat.
Second year.—Summer-fallow.

rotation "C" (three years' duration).

First year.—Summer-fallow.
Second year.—Wheat.
Third year.—Wheat, or coarse grain.

rotation "M" (six years' duration).

First year.—Summer-fallow.
Second year.—Wheat.
Third year.—Coarse grain, manured in fall.
Fourth year.—Summer-fallow.
Fifth year.—Peas and oats for hay.
Sixth year.—Barley or oats.

rotation "S" (nine years' duration).

First year.—Summer-fallow.
Second year.—Hoed crop.
Third year.—Wheat.
Fourth year.—Summer-fallow.
Fifth year.—Wheat.
Sixth year.—Coarse grain.
Seventh year.—Summer-fallow. Manured.
Eighth year.—Peas and oats for hay. Seeded in fall to rye.
Ninth year.—Rye pasture.

rotation "T" (ten years' duration).

First year.—Summer-fallow.
Second year.—Wheat.
Third year.—Oats or barley.
Fourth year.—Seeded to alfalfa in rows.
Fifth year.—Alfalfa hay or seed.
Sixth year.—Alfalfa hay or seed.
Seventh year.—Alfalfa hay, seed or pasture.
Eighth year.—Summer-fallow.
Ninth year.—Hoed crop.
Tenth year.—Wheat, manured on stubble.

CROP ROTATIONS (IRRIGATED LAND).

Two rotations, "U" and "V", have been established since 1911, and a new one, which is styled "X" was begun in 1914. They are as follows:—

ROTATION "U."

First year.—Seeding alfalfa.
Second year.—Alfalfa hay.
Third year.—Alfalfa hay.
Fourth year.—Alfalfa hay.
Fifth year.—Alfalfa hay.
Sixth year.—Alfalfa hay.
Seventh year.—Hoed crop.
Eighth year.—Wheat.
Ninth year.—Oats.
Tenth year.—Barley.

ROTATION "V."

Alfalfa continuously.

ROTATION "X."

This is a fifteen-year rotation. The land is in alfalfa ten years, then is broken and is in ordinary field crops for five. Instead of breaking up one field of alfalfa each year and seeding down a field each year, as is the case in rotation "U," the breaking is done but once in five years, then the five fields that have been used for ordinary cereal and field crops are all seeded down at once and five fresh fields are broken out and used for these crops. The rotation can be perhaps explained in the following manner:—

First year.—Seeding alfalfa.
Second year.—Alfalfa.
Third year.—Alfalfa.
Fourth year.—Alfalfa.
Fifth year.—Alfalfa.
Sixth year.—Alfalfa.
Seventh year.—Alfalfa.
Eighth year.—Alfalfa.
Ninth year.—Alfalfa.
Tenth year.—Alfalfa.
Eleventh year.—Barley.
Twelfth year.—Corn.
Thirteenth year.—Wheat.
Fourteenth year.—Oats.
Fifteenth year.—Peas.

The following tables give details in regard to the results obtained from these rotations:—

LETHBRIDGE.

ROTATION

Rotation Year.	Crops.		Area.	Items of Expense: Rent and manure.	Seed, twine and use of machinery.	Manual labour. Hours.	Manual labour. Cost.	Horse labour (including teamster). Hours. Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
	1914.	1915.	Ac.	$ c.	$ c.	No.	$ c.	No.	No.	No.	No.	No.
1st	Wheat	Wheat	1·57	3 14	3 83	3·00	0 57	.....	.....	1·50	9·17	.....
	Aggregate		....	....	.....	.....	....	....	.....	.....	....	.....
	Average per acre		.....	2 00	2 44	1·91	0 36	.....	.....	0·96	5·84	.....

ROTATION

2nd	Wheat	Summer-fallow	1·57	3 14	0 94	3 25	0 62	0·50	0·25	.....	10·17	.....
1st	Summer-fallow	Wheat	1·57	3 14	3 90	6·50	1 23	.....	.....	2·00	1·92	.....
	Aggregate		3·14	6 28	4 84	9·75	1 85	0·50	0·25	2·00	12·09	.....
	Average per acre		....	2 00	1 54	3·41	0 59	0·16	0·08	0·64	3·85	.....

ROTATION

2nd	Summer-fallow	Wheat	1·57	3 14	3 80	4·50	0 85	.....	.....	2·00	1·92	.....
3rd	Wheat	Oats	1·57	3 14	3 02	8·17	1 55	0·50	0·25	1·50	6·17	.....
1st	Oats	Summer-fallow	1·57	3 14	0 94	0·25	0 05	0·50	0·25	.....	9·75	.....
	Aggregate		4·71	9 42	7 76	12·92	2 45	1·00	0·50	3·50	17·84	.....
	Average per acre		...	2 00	1 65	2·74	0 52	0·21	0·11	0·74	3·79	.....

ROTATION

5th	Summer-fallow	Peas and oats	1·25	5 00	4 32	9·00	1 71	0·75	6·50	1·00	1·92	.....
6th	Peas and oats	Oats	1·25	5 00	2 59	5·00	0 95	.....	....	2·00	6·66	.....
1st	Oats	Summer-fallow	1·25	5 00	0 75	3·08	0 58	0·50	0·25	....	6·42	.....
2nd	Summer-fallow	W. wheat	1·25	5 00	3 08	9·00	1 71	.....	.....	3·50	0·66	.....
3rd	W. wheat	Oats	1·25	5 00	2 41	4·66	0 88	.....	....	1·25	7·00	.....
4th	Oats	Summer-fallow	1·25	5 00	0 75	2·25	0 43	0·50	0·25	.....	6·50	.....
	Aggregate		7·50	30 00	13 90	32·99	6 26	1·75	7·00	7·75	29·16	.....
	Average per acre		.....	4 00	1 85	4·40	0 83	0·23	0·93	1·03	3·89	.....

ROTATION

3rd	Corn	Wheat	1·25	4 17	3 18	4·17	0 79	.....	.....	2·42	0·75	.....
4th	Wheat	Summer-fallow	1·25	4 17	0 75	4·58	0 87	0·50	0·25	....	10·92	.....
5th	Summer-fallow	Wheat	1·25	4 17	3 13	10·75	2 04	.....		4·00	0·58	.....
6th	Wheat	Oats	1·25	4 17	2 51	4·00	0 76	....	2·00	....	7·00	.....
7th	Oats	Summer-fallow	1·25	4 17	0 75	4·42	0 84	0·50	0·25	.....	8·00	.....
8th	Summer-fallow	Peas and oats	1·25	4 17	4 89	11·33	2 15	.....	2·50	4·50	1·50	.....
9th	Peas and oats	Rye, pasture	1·25	4 17	2 00	....	....	.....		.....	5·33	.....
1st	Rye pasture	Summer-fallow	1·25	4 17	0 75	....	....	....		.....	11·50	.....
2nd	Summer-fallow	Corn	1·25	4 17	3 38	64·00	12 16	7·75	0·66	....	2·75	.....
	Aggregate		11·25	37 53	21 34	103·25	19 61	8·75	5·66	10·92	48·33	.....
	Average per acre		.....	3 34	1 89	9·18	1 74	0·78	0·50	0·97	4·30	.....

"A." (wheat continuously).

in raising Crop							Particulars of Crop.						
							Weight.						
Value of horse labour.	Cost of threshing	Total cost.	Cost of 1 acre.	Cost for 1 bushel.	Cost for 1 ton.	Height of stubble.	Grain.	Straw.	Hay.	Hoed crop.	Total value.	Value of crop per acre.	Profit or loss per acre.
$ c.	$ c.	$ c.	$ c.	Cts.	$ c.	Inch.	Lb.	Lb.	Lb.	Lb.	$ c.	$ c.	$ c.
5 01	5 98	18 53	11 80	21·7	.....	10-12	5,125	6,805	.....	.....	71 73	45 69	33 89
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3 19	3 81	.....	11 80	.....	.....	.....	.....	.....	.....	.....	.....	45 69	33 98
"B." (two years' duration).													
5 09	.....	9 79	6 24	.....	.....	.....	.....	.....	.....	.....	.....	.....	−6 24
1 74	6 61	16 62	10 58	18	.....	.....	5,670	7,880	.....	.....	79 54	50 66	40 08
6 83	6 61	20 41	.....	.....	.....	.....	.....	.....	.....	.....	79 54	.....	.....
2 17	2 11	.....	8 41	.....	.....	.....	.....	.....	.....	.....	.....	25 33	16 92
"C." (three years' duration).													
1 74	6 93	16 46	16 48	16·6	.....	8–10	5,945	7,480	.....	.....	83 01	52 87	42 39
3 78	7 51	19 00	12 10	10·1	.....	8–10	6,380	5,330	.....	.....	69 13	44 03	31 93
4 89	.....	9 02	5 75	.....	.....	.....	.....	.....	.....	.....	.....	.....	−5 75
10 41	14 44	44 48	.....	.....	.....	.....	.....	.....	.....	.....	152 14	.....	.....
2 21	3 06	.....	9 44	.....	.....	.....	.....	.....	.....	.....	.....	32 30	22 86
"M." (six years' duration).													
3 74	.....	14 77	11 82	.....	2 58	3	.....	.....	11,460	.....	57 30	45 84	34 02
4 02	7 54	20 10	16 08	10·7	.....	8	6,410	5,900	.....	.....	70 00	56 00	39 92
3 29	.....	9 62	7 70	.....	.....	.....	.....	.....	.....	.....	.....	.....	−7 70
1 75	5 13	16 67	13 34	22·8	.....	.....	4,395	7,230	.....	.....	62 21	49 77	36 43
3 87	5 40	17 56	14 05	13·0	.....	.....	4,590	4,440	.....	.....	50 34	40 27	26 22
3 33	.....	9 51	7 61	.....	.....	.....	.....	.....	.....	.....	.....	.....	−7 61
20 00	18 07	88 23	.....	.....	.....	.....	.....	.....	.....	.....	239 85	.....	.....
2 67	2 41	.....	11 76	.....	.....	.....	.....	.....	.....	.....	.....	31 98	20 22
"S." (nine years' duration).													
1 35	5 76	15 25	12 20	18·5	.....	7	4,940	6,205	.....	.....	68 97	55 18	42 98
5 45	.....	11 24	8 99	.....	.....	.....	.....	.....	.....	.....	.....	.....	−8 99
1 92	5 07	16 33	13 06	22·6	.....	9	4,345	6,365	.....	.....	61 11	48 89	35 83
4 04	4 65	16 13	12 90	13·9	.....	8	3,950	4,750	.....	.....	44 25	35 40	22 50
4 05	.....	9 81	7 85	.....	.....	.....	.....	.....	.....	.....	.....	.....	−7 85
3 41	.....	14 62	11 70	.....	.....	6	.....	.....	7,520	.....	37 60	30 08	18 38
2 56	.....	8 73	6 98	.....	.....	.....	.....	.....	Pasture	.....	11 56	9 25	2 27
5 52	.....	10 44	8 35	.....	.....	.....	.....	.....	347 dys.	.....	.....	.....	−8 35
3 63	.....	23 34	18 67	.....	.....	.....	.....	.....	.....	39,870	59 80	47 84	29 17
31 93	15 48	125 89	.....	.....	.....	.....	.....	.....	.....	.....	283 29	.....	.....
2 84	1 38	.....	11 19	.....	.....	.....	.....	.....	.....	.....	.....	25 18	13 99

ROTATION

Rotation Year.	Crops. 1914.	Crops. 1915.	Area.	Items of Expense: Rent and manure.	Seed, twine and use of machinery.	Manual labour. Hours.	Manual labour. Cost.	Horse labour (including teamster). Hours. Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
			Ac.	$ c.	$ c.	No.	$ c.	No.	No.	No.	No.	No.
8th...	Alfalfa seed....	Summer-fallow	1·57	5 04	0 94	.....	.....	.....	.....	.....	18·66	.....
9th...	Summer-fallow	Turnips.....	1·57	5 04	1 50	114·00	21 66	5·75	25·00	.....	3·42	.....
10th..	Turnips.....	Wheat.....	1·57	5 04	3 90	5·50	1 04	....	.....	1·50	1·17	.....
1st....	Wheat..	Summer-fallow	1·57	5 04	0 94	0·25	0 05	0·50	0·25	.....	8·33	.....
2nd...	Summer-fallow	W. wheat.....	1·57	5 04	3 93	15·33	2 91	.....	.....	3·50	0·75	.....
3rd...	W. wheat.....	Oats.....	1·57	5 04	3 02	8·00	1 52	....	....	3·50	7·83	.....
4th...	Oats.....	Seeding alfalfa.	1·57	5 04	2 44	2·00	0 38	11·50	3·25	.....	9·33	.....
5th...	Seeding alfalfa.	Alfalfa seed....	1·57	5 04	2 44	2·00	0 38	11 50	3·25	.....	4·00	.....
6th...	Alfalfa seed....	Alfalfa seed....	1·57	5 04	2 44	4·42	0 84	.....	4·42	.....	8·00	.....
7th...	Alfalfa seed....	Alfalfa seed....	1·57	5 04	2 44	4·42	0 84	.....	4·42	.....	8·00	.....
	Aggregate.....		15·70	50 40	23 99	155·92	29 62	29·25	40·59	8·50	69·49	.....
	Average per acre.....		....	3 21	1 53	9·93	1 89	1·86	2·59	0·54	4·43	.....

ROTATION

5th...	Alfalfa hay....	Alfalfa hay....	1	4 45	2 60	7·75	1 47	2·66	5·00	.....	.....	.....
4th...	"	"	1	4 45	2 60	9·25	1 76	2·42	6·50	.....	.....	.....
3rd...	"	"	1	4 45	2 60	9·50	1 80	2·42	6·58	.....	.....	.....
2nd...	Alfalfa seeding	"	1	4 45	2 60	9·08	1 72	2·42	8·00	.....	.....	.....
1st....	Barley.....	Alfalfa seeding	1	4 45	2 60	4·25	0 81	0·42	2·50	.....	2·42	.....
10th..	Oats.....	Barley.....	1	4 45	1 96	1·58	0 30	....	.....	0·92	5·58	.....
9th...	Wheat.....	Oats.....	1	4 45	1 91	1·66	0 31	.....	.....	1·66	5·66	.....
8th...	Potatoes.....	Wheat.....	1	4 45	2 46	1·83	0 35	.....	.....	2·50	1·50	.....
7th...	Alfalfa hay....	Potatoes.....	1	4 45	21 30	172·00	32 68	7·25	17·00	.....	6·00	6·50
6th...	Alfalfa hay....	Alfalfa hay....	1	4 45	2 60	9·58	1 82	2·66	5·66	.....	.....	.....
	Aggregate.....		10	44 50	43 23	226·48	43 02	20·25	51·24	5·08	21·16	6·50
	Average per acre.....		....	4 45	4 32	22·64	4 30	2·02	5·12	0·50	2·11	0·65

ROTATION

1st....	Alfalfa hay....	Alfalfa hay.....	1·06	3 18	0 64	12·42	2 36	2·00	6·00	.....	.....	.....
	Aggregate.....		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Average per acre.....		.....	3 00	0 60	11·72	2 23	1·89	5·66	.....	.....	.....

ROTATION

2nd...	Barley.....	Corn.....	1	3 80	2 87	72·58	13 79	7·92	0·66	.....	6·83	.....
3rd...	Corn....	Wheat.....	1	3 80	2 58	3·00	0 57	.....	.....	1·50	1·83	.....
4th...	Wheat.	Oats.....	1	3 80	2 06	1·66	0 31	.....	.....	1·66	5·66	.....
5th...	Oats...	Peas.....	1	3 80	3 00	2·00	0 38	.....	2·00	.....	5·75	.....
1st....	Peas...	Barley.....	1	3 80	2 06	4·00	0 76	.....	.....	2·00	2·50	.....
6th...	Alfalfa seeding	Alfalfa hay....	1	3 80	1 80	10·15	1 93	2·23	6·50	....	.....	.....
7th...	"	"	1	3 80	1 80	10·15	1 93	2·23	6·50	.....	.....	.....
8th...	"	"	1	3 80	1 80	10·15	1 93	2·23	6·50	.....	.....	.....
9th...	"	"	1	3 80	1 80	10·15	1 93	2·23	6·50	.....	.....	.....
10th..	"	"	1	3 80	1 80	10·15	1 93	2·23	6·50	....	.....	.....
11th..	Grain hay.....	Alfalfa seeding.	1	3 80	1 80	2·66	0 50	0·24	1·50	.....	6·80	.....
12th..	"	" "	1	3 80	1 80	2·66	0 50	0·24	1·50	.....	6·80	.....
13th..	"	" "	1	3 80	1 80	2·66	0 50	0·24	1·50	....	6·80	.....
14th..	"	" "	1	3 80	1 80	2·66	0 50	0·24	1·50	.....	6·80	.....
15th..	"	" "	1	3 80	1 80	2·66	0 50	0·24	1·50	.....	6·80	.....
	Aggregate.....		15	57 00	30 57	147·29	27 96	20·27	42·66	5·16	56·57	.....
	Average per acre.....		....	3 80	2 04	9·82	1 86	1·35	2·84	0·34	3·77	.....

"I." (ten years' duration).

in raising Crop.							Particulars of Crop.						
							Weight.						
Value of horse labour.	Cost of threshing.	Total cost.	Cost for 1 acre.	Cost for 1 bushel.	Cost for 1 ton.	Height of stubble.	Grain.	Straw.	Hay.	Hoed crop.	Total value.	Value of crop per acre.	Profit or loss per acre.
$ c.	$ c.	$ c.	$ c.	Cts.	$ c.	Inch.	Lb.	Lb.	Lb.	Lb.	$ c.	$ c.	$ c.
8 96	.....	14 94	9 52	.....	.....	.....	.....	.....	.....	.....	.....	.....	−9 52
11 69	.....	39 89	25 41	4·0	.....	.....	.....	.....	.....	58,685	88 03	56 07	30 66
1 17	6 57	17 72	11 29	19·0	.....	.....	5,630	4,935	.....	.....	77 54	49 39	38 10
4 21	.....	10 24	6 52	.....	.....	.....	.....	.....	.....	.....	.....	.....	−6 52
1 79	8 41	22 08	14 06	18·0	.....	.....	7,211	7,069	.....	.....	99 67	63 48	49 42
5 19	8 53	23 30	14 84	11·0	.....	.....	7,250	6,780	.....	.....	79 28	50 50	35 66
8 68	.....	16 54	10 54	.....	.....	.....	.....	.....	.....	.....	.....	.....	−10 54
6 12	.....	13 98	8 90	.....	.....	.....	.....	.....	.....	.....	.....	.....	−8 90
5 34	1 10	14 76	9 40	13·42	.....	.....	66	.....	.....	.....	33 00	21 02	11 62
5 34	0 87	14 53	9 25	16·70	.....	.....	5,225	.....	.....	.....	26 12	16 63	7 38
58 49	25 48	187 98	.....	.....	.....	.....	.....	.....	.....	.....	403 64	.....	.....
3 73	1 62	...	11 97	.....	.....	.....	.....	.....	.....	.....	.....	25 71	13 74

"U." (ten years' duration).

2 42	.....	10 94	10 94	.....	2 46	.....	.....	.....	8,880	.....	53 28	53 28	42 34
2 86	.....	11 67	11 67	.....	2 19	.....	.....	.....	10,625	.....	63 75	63 75	52 08
2 89	.....	11 74	11 74	.....	2 14	.....	.....	.....	10,945	.....	65 67	65 67	53 93
3 37	.....	12 14	12 14	.....	2 74	.....	.....	.....	8,845	.....	53 07	53 07	40 93
2 12	.....	9 98	9 98	.....	7 95	.....	.....	.....	2,510	.....	15 06	15 06	5 08
3 06	2 82	12 59	12 59	22·3	.....	6	2,710	3,070	.....	.....	30 17	30 17	17 58
3 40	3 68	13 75	13 75	15·0	.....	8	3,130	3,495	.....	.....	34 79	34 79	21 04
1 74	3 01	12 01	12 01	27·9	.....	8–12	2,580	5,240	.....	.....	37 02	37 02	25 01
										{27,800	231 66	.....	
14 18	.....	72 61	72 61	15·1	.....	.....	.....	.....	.....	{1,045}	1 57	233 23	160 62
2 64	.....	11 51	11 51	.....	1 88	.....	.....	.....	12,250	.....	73 50	73 50	61 99
38 68	9 51	178 94	.....	.....	.....	.....	.....	.....	.....	.....	659 54	.....	.....
3 87	95		17 89									65 95	48 06

"V." (alfalfa continuously.)

2 58	....	8 76	8 26	.....	.....	.....	.....	.....	11,745	.....	70 47	66 48	58 22
.....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
2 43	...	.....	8 26	.....	.....	...	.....	.....	.....	.....	.....	66 48	58 22

"X." (fifteen years' duration).

5 64	...	26 10	26 10	.....	1 64	.....	.....	.....	.....	31,818	47 73	47 73	21 63
1 49	4 91	13 35	13 35	19·0	.....	8–10	4,210	5,260	.....	.....	58 76	58 76	45 41
3 40	4 39	13 96	13 96	12·7	.....	10	3,730	5,625	.....	.....	42 92	42 92	28 96
3 44	2 45	13 07	13 07	37·2	.....	.....	2,105	6,315	.....	.....	37 88	37 88	24 81
2 02	3 71	12 35	12 35	16·6	.....	6	3,560	4,620	.....	.....	40 22	40 22	27 87
2 81	.....	10 34	10 34	.....	2 47	.....	.....	.....	8,374	.....	50 24	50 24	39 90
2 81	.....	10 34	10 34	.....	2 47	.....	.....	.....	8,374	.....	50 24	50 24	39 90
2 81	.....	10 34	10 34	.....	2 47	.....	.....	.....	8,374	.....	50 24	50 24	39 90
2 81	.....	10 34	10 34	.....	2 47	.....	.....	.....	8,374	.....	50 24	50 24	39 90
2 81	.....	10 34	10 34	.....	2 47	.....	.....	.....	8,374	.....	50 24	50 24	39 90
3 83	.....	9 93	9 93	.....	5 43	.....	.....	.....	3,659	.....	21 95	21 95	12 02
3 83	.....	9 93	9 93	.....	5 43	.....	.....	.....	3,659	.....	21 95	21 95	12 02
3 83	.....	9 93	9 93	.....	5 43	.....	.....	.....	3,659	.....	21 95	21 95	12 02
3 83	.....	9 93	9 93	.....	5 43	.....	.....	.....	3,659	.....	21 95	21 95	12 02
3 83	.....	9 93	9 93	.....	5 43	.....	.....	.....	3,659	.....	21 95	21 95	12 02
49 19	15 46	180 18	.....	.....	.....	.....	.....	.....	.....	.....	588 46	.....	.....
3 28	1 03	.....	12 01	.....	.....	.....	.....	.....	.....	.....	.....	39 23	27 22

In the following table the items of greatest interest in connection with the foregoing rotations are given:—

Cost of Operations, value of Products and Profits.

Rotations.	Total cost per acre.	Total value per acre.	Net profit per acre, 1915.	Average net profit per acre for 4 years.
	$ cts.	$ cts.	$ cts.	$ cts.
Non-irrigated—				
"A"—(Wheat continuously)	11 80	45 69	33 89	10 94
"B"—Two years' duration	8 41	25 33	16 92	6 03
"C"—Three years' duration	9 44	32 30	22 86	8 86
"M"—Six years' duration	11 76	31 98	20 22	7 00
"S"—Nine years' duration	11 19	25 18	13 99	5 79
"T"—Ten years' duration	11 97	25 71	13 74	13 53
Irrigated—				
"U"—Ten years' duration	17 89	65 95	48 06	52 25
"V"—Alfalfa hay continuously	8 26	66 48	58 22	51 96
"X"—Fifteen years' duration	12 01	39 23	27 22	14 90[1]

[1]Average profit for 2 years only.

DATES OF SEEDING.

In the following tables the results obtained from wheat, oats, barley, and flax sown at different dates are of interest. Four years' results are available from this test with the exception of flax. It is the plan to continue these tests for a number of seasons. It is interesting to note that with both wheat and oats the plot sown on April 1 gave the highest yield. With barley the average for the four years would seem to indicate that it was not so important under our conditions to get the seeding done particularly early, as it will be noticed that the yield of grain sown on May 1 was higher than that sown on April 1, although in the season just past the April 1 seeding made the best record of all. With flax, that sown on May 1 gave the best yield and judging from the yields it would appear that flax would be better sown from May 1 to May 15 than from April 15 to May 1.

Dates of seeding Marquis wheat (Non-irrigated) on Summer-Fallow.

Date sown.	Date ripe.	Yield per acre, 1915.	Average yield per acre for 4 years.
		Bush. Lb.	Bush. Lb.
April 1	August 10	60 00	35 30
April 11	August 13	50 00	31 41
April 21	August 17	47 30	30 52
May 1	August 28	41 30	31 19
May 11	August 30	41 00	30 34
May 21	September 11	37 00	30 22
June 1—Damaged by frost September 18		26 00	— —
June 11—Cut for green feed September 30		— —	— —
June 21—Cut for green feed September 30		— —	— —

Lethbridge.

DATES of seeding Banner Oats (Non-irrigated) on Summer-fallow.

Date sown.	Date ripe.	Yield per acre. 1915.	Average yield per acre for 4 years.
		Bush. Lb.	Bush. Lb.
April 1	August 9	144 24	84 18
April 15	August 13	120 00	83 9
May 1	August 17	114 24	81 32
May 15	August 28	97 2	81 28
June 1	August 31	81 6	[1]79 4
June 15—Damaged by frost September 18		37 2	— —

[1]Average for 3 years.

DATES of seeding Manchurian Barley (Non-irrigated) on Summer-fallow.

Date sown.	Date ripe.	Yield per acre, 1915.	Average yield per acre for 4 years.
		Bush. Lb.	Bush. Lb.
April 1	August 3	85 00	41 38
April 15	August 5	70 00	40 30
May 1	August 12	81 12	45 7
May 15	August 22	70 00	40 26
June 1	August 27	68 36	42 1
June 15 (Damaged by frost September 18		45 00	*41 32

*Average for 3 years. Crop damaged by frost in 1912 also.

DATES of seeding Flax (Non-irrigated) on Summer-fallow.

Date sown.	Date ripe.	Yield per acre, 1915.
		Bush. Lb.
April 1	August 30	1 04
April 15	Sept. 1	19 16
May 1	Sept. 2	30 00
May 15	Sept. 3	28 52
June 1	Sept. 26	17 08
June 15	Sept. 30	13 52

CULTURAL EXPERIMENTS.

PRAIRIE BREAKING.

In this experiment flax, wheat, peas and oats for feed have been sown on fresh breaking and wheat on June breaking and on backsetting. The one point that has been demonstrated quite clearly is that, in handling prairie sod, the most profitable way is to break in May or June and allow to stand over, or to break very shallow in the spring and backset in the late summer or fall about 2 inches deeper than the land was broken.

LETHBRIDGE.

BREAKING CULTIVATED SOD.

The character of the sod used in this experiment was a mixture of western rye grass, timothy, clover and alfalfa. The best results obtained were by breaking in the spring and treating it for the rest of the season as a fallow. The next best results, and they appear to be nearly as good, were obtained when the sod was broken early in July immediately after the hay crop had been taken off.

DEPTH OF PLOUGHING.

In the experiments in which the depth of ploughing is considered, the results in many of the plots are more or less contradictory. In ploughing for summer-fallow deep ploughing has given much better results. For example, in comparing results from fallowed plots that had been ploughed 4 inches, 6 inches and 8 inches deep, the yield of wheat has been:—

	Per Acre. Bush.	Lb.
Fallow ploughed 4 inches deep, average for four years	27	27
" 6 " "	30	22
" 8 " "	33	45

The increased yield due to the deeper ploughing is so marked that a farmer can scarcely afford to continue with the shallow cultivation that is so commonly practised in so many localities in this part of the Province.

In regard to the best depth to break cultivated sod, the average yield of wheat for three years on cultivated sod broken in the fall has been as follows:—

3-inch breaking gave 22 bushels 20 pounds per acre.
4-inch " " 24 " 20 " "
5-inch " " 25 " 47 " "

In ploughing wheat stubble in the spring for oats, deeper ploughing appears to be advisable as the average results for three years give the following:—

Spring-ploughed 3 inches deep gave 58 bushels 15 pounds per acre of oats.
" 4 " 61 " 19 " "
" 5 " 71 " 13 " "
" 6 " 72 " 32 " "

TIME OF PLOUGHING.

The best time to plough for summer-fallow appears to be some time before the end of June. Results indicate that one ploughing 8 inches deep and sufficient surface cultivation during the summer to destroy all growth of vegetation give better results than ploughing twice, either when both ploughings in the spring and fall are shallow, or when one is shallow and the other deep. As a general rule deep ploughing for fallow leaves the land freer from weeds than is the result with shallower ploughing. Results from the spring ploughed stubble land as compared to fall ploughed stubble land are rather interesting, as they are different from what is ordinarily expected. It was found that in nearly all seasons spring ploughing gives better yields than fall ploughing. The average results for the last four years with wheat gave 2½ bushels to the acre larger yield on spring ploughing than on fall ploughing. In this average is included the 1915 yield, but had this been omitted the difference in favour of spring ploughing would have been greater, for the conditions during the season just past were such as to make fall ploughing desirable. The fall of 1914 was wet and snow lay on the ground almost continuously during the winter of 1914-15, producing results very similar to Eastern conditions, the result being that in 1915 grain sown on fall ploughing gave a larger yield than when sown on spring ploughing. The reason for stubble land giving better results when ploughed in the spring is probably due to the fact that as a rule our land is not particularly wet in the fall when it is ploughed. The chinook winds ordinarily keep the land, particularly ploughed land, bare of snow during a greater part of winter, and the soil thus exposed to the

drying effects of wind and sun is nearly always loose and in a condition to dry out rapidly early in the spring. The case is different, however, with spring-ploughing, for during the winter the snow is caught by the stubble and held so that when it is ploughed there is some moisture left in the soil and the conditions generally are better for seeding. These results are in accord with our general observation regarding this point for the last few years in the district.

PACKING.

The value or need of packing depends a great deal on the character of the particular soil being worked with. On loose, friable soil containing a great deal of humus the use of a packer is required more than in the case of a soil which, owing to its physical texture, has a tendency to go together or become firm with the first rains that fall after being ploughed. On this account it would be unwise to draw any very definite conclusions as to the value of packing that would be applicable to all conditions, from experiments conducted on one kind of soil only. However, from our tests with various packers and the use of them at different times, a few points appear to have been demonstrated. The subsurface packer shows a slight but consistent advantage over the surface packer or the combination packer. There is an advantage in packing summer-fallow in the spring either before or after seeding, (and with an ordinary drill it appears to pay to do it after seeding), but we have found no appreciable advantage in packing the soil at the time the land is being ploughed for summer-fallow. Packing spring ploughed stubble gave an average increase of 2 bushels of wheat per acre over land treated in every way the same except being left unpacked. We have been unable to find any advantage in packing fall ploughed stubble land either in the fall or in the spring, although we would not be prepared to consider our experiments in this particular line as conclusive evidence that packing of fall ploughing would not be advisable.

PREPARATION OF SEED BED.

Thorough work in the preparation of the seed-bed, such as plenty of surface cultivation in the way of discing and harrowing, gave us an increased yield in every case. This has been particularly true with oats sown on fall ploughing, i.e. it pays to do plenty of work on such land in the spring before seeding.

DEPTH OF SEEDING.

In this experiment, in which grain was sown 1-inch, 2 inches, 3 inches and 4 inches deep, we found that 2-inch and 3-inch seeding gave the best results but that there was not much difference between them and that either of these two depths was better than when the grain was sown 1-inch deep or 4 inches deep. In general it was found that when the seed was put down in the moisture, but no deeper than was really necessary to reach this point, the best results were obtained, because the germination was more even and the plants were more apt to be vigorous from the beginning.

MANURING.

In applying manure our best results have been obtained by applying the manure to the land previous to ploughing for summer-fallow so that it would be turned under at that time. In this way it is pretty well rotted and fairly well incorporated into the soil before a crop is planted thereon. Our tests with green manuring would indicate that it is not advisable to grow a crop, such as field peas for instance, and plough under when it has made a good growth of vines. So much of the moisture in the land is used up to produce the growth that the soil is too dry to be ploughed satisfactorily. It is lumpy when turned over, and is left so open, loose and dry that the vegetation turned under does not rot properly.

SEEDING DOWN TO GRASSES.

Sowing grass seed without a nurse crop was in every case the most satisfactory and safest way of getting a stand with due regard to the yields of the hay obtained in the following seasons.

LETHBRIDGE.

EXPERIMENTAL STATION FOR CENTRAL ALBERTA, LACOMBE, ALTA.

REPORT OF THE SUPERINTENDENT, G. H. HUTTON, B.S.A.

WEATHER DURING GROWING SEASON OF 1915.

Although the total precipitation for 1915 was but very slightly above the average, the fact that over 16 inches fell during the six growing months accounts to some extent for the large yields that were secured both on the Lacombe Station and farms in other parts of central Alberta. The temperature during the season was average and no damaging frosts were recorded until September 13. Work on the land was commenced on April 3, the first sowing being done April 9. The abundant rainfall throughout the growing season provided for very luxuriant growth, while the bright, warm weather of the latter part of July and first two weeks of August hastened ripening very materially. Prelude wheat in the field was harvested August 16, while the cutting of wheat, oats, and barley on the rotations extended from August 19 to September 2. All grain was in the stook before the frost on September 13. Numerous light showers during the period extending from the 6th to the 24th of September hindered threshing somewhat, but this operation was finished early in October. All grain was well matured and of a quality somewhat above the average.

SOME Weather Observations taken at Experimental Station, Lacombe, 1915.

Month.	Temperature F.			Precipitation.				Total Sunshine.
	Mean.	Highest.	Lowest.	Rainfall.	Snowfall.	Total Precipitation.	Heaviest in 24 hours.	
	°	°	°	Inches.	Inches.	Inches.	Inches.	Hours.
January	13·5	40·8	−25·1		2·95	0·295	0·25	70·0
February	17·4	42·8	− 6·6		0·25	0·025	0·25	109·8
March	27·8	64·8	− 1·1	0·075		0·075	0·05	163·9
April	47·5	76·8	13·9	0·120	2·0	0·320	0·1	214·8
May	51·4	76·3	31·9	1·245		1·245	0·33	130·1
June	52·1	75·8	31·9	8·485		8·485	2·20	179·6
July	57·4	79·8	34·9	3·370		3·370	0·9	239·4
August	63·7	88·6	40·9	0·840		0·840	0·45	298·9
September	36·7	74·3	16·0	1·833		1·833	0·68	170·2
October	42·0	74·2	9·9	0·533		0·533	0·213	144·7
November	24·2	53·8	− 8·4		3·0	0·300	0·3	121·0
December	5·5	48·8	−12·1					83·4
Total for year				16·501	8·20	17·321		1,925·8
Average for 8 years						17·404		2,188·3
Total for six growing months, April to Sept., 1915						16·093		1,233·0
Average for 8 years for six growing months, April to September						13·959		1,450·8

COST OF PRODUCTION OF CROPS.

COST OF PRODUCING HAY.

The cost of producing hay is given below, from data recorded in handling a crop of 68 tons from a field of 37 acres used in the main farm rotation. The average time required to mow an acre of hay was 55 minutes.

Number of acres, 37.
Preceding crop: Barley.
Items of cost:

Rent, 37 acres at $2	$ 74 00
Manure, one-sixth share of 12 tons per acre at $1 per ton	74 00
Use of machinery, 37 acres at 60 cents	22 20
Manual labour in field and barn, harvesting and storing hay, 113 hours at 19 cents	21 47
Hauling, 1 man and 2 horses, 86·66 hours at 34 cents	29 46
Unloading at barn, 1 boy and 2 horses, 34 hours at 26 cents	8 84
Mowing, man and 2 horses, 32·5 hours at 34 cents	11 05
Tedding and raking, man and 2 horses, 55 hours at 34 cents	18 70
Seeding, one-third of grass seed at $1.19 per acre for 4 pounds timothy, and 3 pounds alsike	14 68
Total cost for 37 acres	$274 40

Total yield from 37 acres, 68 tons.
Yield per acre, 1 ton 1,676 pounds.
Cost per acre, $7.42.
Cost per ton, $4.04.

ROTATIONS.

Results of rotations "C," "L," "K," and "O" are submitted in tabular form on a following page. Some very interesting data have been secured on these rotations which are particularly valuable now as figures are available for a number of years.

ROTATION "C" (THREE YEARS' DURATION).

First year.—Wheat.
Second Year.—Wheat.
Third year.—Summer-fallow.

This rotation, as practised at Lacombe, shows what results may be expected from this system of farming here. The summer-fallow is well worked throughout the entire season with a view to eradicating as many weeds as possible. Wheat sown on this land the following spring has given very ordinary yields. The second year wheat is sown on the stubble land and packed. This is a practice commonly adopted where a system of grain farming is followed rather than mixed farming. In 1915 the profit over this entire rotation was $3.27 per acre. The average profit for the past five years has been $6.94 per acre. The figures showing the cost of producing a bushel of wheat clearly demonstrate the value of good farming where large crops are secured. When the yield of wheat was 35·6 bushels per acre the cost per bushel to produce was 42·4 cents, while on the second year crop where a yield of only 10·3 bushels was obtained the cost per bushel was 77·8 cents. A still greater contrast is secured when we compare figures taken from rotation "O." A crop of wheat sown on land that had previously grown roots gave a yield of 70·5 bushels to the acre which cost 21·1 cents per bushel to produce. The profit per acre ranged from $2.21 for the poorest yield to $45.07 for the best yield. These figures as shown in the tabulated forms speak for themselves. Such a rotation as "C" tends to exhaust the vegetable matter from the soil and to allow weeds to gain a foothold.

ROTATION "L" (SIX YEARS' DURATION).

First year.—Hay.

Second year.—Pasture, manured 12 tons per acre.

Third year.—Pasture, broken from sod in July.

Fourth year.—Wheat.

Fifth year.—Oats.

Sixth year.—Barley, seeded down to grass, 4 pounds timothy, 4 pounds alsike, 4 pounds red clover.

The net profit per acre on rotation "L" was $7.63 in 1915, while the average profit per acre for the last five years has been $5.51. This is a rotation suitable for mixed farming and has given such satisfaction that it is used as a rotation for our large fields. Oats are used as a fourth year crop on the main farm instead of wheat since they are a sure crop and always in demand for feeding the live stock. It has not been found necessary to summer-fallow in order to conserve moisture at this Station. The three years in hay and pasture together with the practice of breaking the land in July and early cultivation the following spring in this rotation are reducing the number of weeds to a considerable extent in the fields on the main farm. Manure being applied in winter on the first year in pasture, allows the many weed seeds to germinate the following spring during the rainy season, in the small particles of manure, and later in the summer these are killed from exposure to the sun and lack of moisture. The manure being turned under in the fall is fairly free from weed seeds and has a stimulating effect on the grass for pasture as well as on the crops to follow.

ROTATION "K" (SIX YEARS' DURATION).

First year.—Hoed crop, peas or mixed grain.

Second year.—Wheat.

Third year.—Oats or barley. Seeded down per acre as follows: one-third, alsike clover 6 pounds and rye grass 10 pounds; one-third, alsike clover 6 pounds, alfalfa 6 pounds and timothy 3 pounds; one-third, alsike clover 2 pounds, red clover 6 pounds, timothy 2 pounds and rye grass 2 pounds.

Fourth year.—Hay. Manured in autumn 12 tons per acre.

Fifth year.—Pasture.

Sixth year.—Pasture. Ploughed July after haying, in preparation for roots.

This is a mixed farming rotation similar to "L" except that a crop of roots is grown in place of one crop of grain. The average profit per acre for the last five years on this rotation has been $8.84.

ROTATION "O" (SEVEN YEARS' DURATION).

First Year.—Hoed crops, or peas and oats mixed, cut early, and land disced and cultivated in fall.

Second year.—Wheat.

Third year.—Oats.

Fourth year.—Summer-fallow.

Fifth year.—Barley. Seeded down with 3 pounds timothy, 2 pounds alsike and 6 pounds alfalfa per acre.

Sixth year.—Hay. Manured in fall 6 tons per acre.

Seventh year.—Pasture. Portion intended for roots the following year to be ploughed early July.

LACOMBE.

The average profit on this rotation during the last five years has been $13.12 per acre over the entire rotation. In 1915 the crop of Marquis wheat on this rotation had an average yield of 70 bushels and 33 pounds per acre. Good farming methods are profitable in a year of abundant rains as well as in a season of unfavourable conditions.

These two rotations, "O" and "K," although giving excellent profits are not profitable rotations for a farmer to follow here as too large a portion of his farm would be under roots or hoed crop and he would find it difficult to secure labour to handle the crop.

Although green feed might be grown in lieu of roots we feel sure the profit from such a crop would be much less than for roots and also that the succeeding crops would be reduced in yield to a great extent.

The results from these rotations have been arrived at according to values of costs and returns as given in the appended table.

RETURN VALUES.

Wheat (from the machine)	per pound.	1¾ cents.
Barley	"	1 cent.
Oats	"	1 cent.
Timothy hay	per ton.	$10 00
Red clover hay	"	10 00
Alsike hay	"	10 00
Alfalfa hay	"	12 00
Mixed hay	"	10 00
Oat straw	"	2 00
Barley straw	"	2 00
Wheat straw	"	1 00
Corn ensilage	"	3 00
Mangels and turnips	"	3 00
Sugar beets	"	4 00
Pasture, each horse	per month.	1 00
" " cow	"	1 00
" " sheep	"	25

COST VALUES.

Rent	per acre.	$ 2 00
Barnyard manure spread on fields (charged equally over all years of the rotation)	per ton.	1 00
Seed wheat	per bush.	1 00
Seed oats	"	50
Seed barley	"	50
(All other seeds charged at cost. Cost of grass is charged equally over all years producing grass. Twine charged at actual cost. These figures for 1915 were as follows:)		
Alsike clover seed	per pound.	25
Timothy seed	"	11
Rye grass seed	per pound.	14
Red clover seed	"	27
Turnip seed	"	30
Mangel seed	"	30
Corn	per bush.	2 40
Alfalfa (Alberta Grown Grimm)	per pound.	75
Twine	"	11
Machinery	per acre.	60
Manual labour	per hour.	19
Horse labour (including teamster)—		
Single-horse	"	27
Two-horse team	"	34
Three-horse team	"	41
Four-horse team	"	48
Threshing (covering work from stook to granary)—		
Wheat	per bush.	07
Oats	"	04
Barley	"	05

ROTATION

Rotation Year.	Crops.		Area.	Items of Expense								
				Rent and manure.	Seed, twine and use of machinery.	Manual labour.		Horse labour (including teamster). Hours.				
						Hours.	Cost.	Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
	1914.	1915.	Ac.	$ c.	$ c.	No.	$ c.	No.	No.	No.	No.	No.
1st	Summer-fallow	Wheat	1	2 00	4 25	1·66	32	.....	11·43	...	4·41	...
2nd	Wheat	Wheat	1	2 00	4 09	1·0	19	.....	.....	.....	2·17	...
3rd	Wheat	Summer-fallow	1	2 00	0 60	4·0	76	.....	8·67	.....	5·08	..
	Aggregate		3	6 00	8 94	6·66	1 27	.....	20·1	....	11·66	..
	Average per acre, 1915		.....	2 00	2 98	2·22	0 42	.....	6·7	....	3·89	...

ROTATION

1st	Pasture	Hoed crop	3·60	14 40	4 71	176·91	33 61	15·83	128·25	.....	12·25	...
2nd	Hoed crop	Wheat	3·56	14 24	12 78	6·42	1 22	.....	4·5	.....	11·58	.....
3rd	Wheat	Barley	3·50	14 00	8 16	7·0	1 33	.....	5·5	3·0	18·50	.....
4th	Barley	Hay	3·41	13 64	6 66	8·5	1 62	.....	19·75	.....	.....	.....
5th	Hay	Pasture	3·53	14 12	6 73	0·75	0 14	.....	.....	.....	.....	.....
6th	Pasture	Pasture	3·63	14 52	6 79	0·75	0 14	.....	.....	.....	.....	.....
	Aggregate		21·23	84 92	45 83	200·33	38 06	15·83	158·00	3·0	42·33	....
	Average per acre, 1915		.....	4 00	2 15	9·43	1 79	·74	7·44	0·14	1·99	.....

ROTATION

1st	Barley	Hay	1·74	6 96	2 51	14·92	2 83	.....	8·42	.....	.....	.....
2nd	Hay	Pasture	1·74	6 96	2 51	.....	.....	.....	.....	.....	.....	...
3rd	Pasture	Pasture	1·74	6 96	2 51	.....	.....	.....	.....	.....	.....	....
4th	Pasture	Wheat	1·74	6 96	4 59	2·00	0 38	...	28·33	....	0·92	.....
5th	Wheat	Oats	1·74	6 96	5 77	2·66	0 51	..	1·5	1·5	9·83	.....
6th	Oats	Barley	1·74	6 96	3 98	2·00	0 38	...	1·5	1·5	7·67	.....
	Aggregate		10·44	41 76	21 87	21·58	4 10	...	39·75	3·0	18·42	.....
	Average per acre, 1915		.....	4 00	2 09	2·07	0 39	....	3·81	0·29	1·76	.....

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"C" (Three years' duration).

in raising Crop.							Particulars of Crop.						
							Weight.						
Value of horse labour.	Cost of threshing.	Total cost.	Cost of 1 acre.	Cost for 1 bushel.	Cost for 1 ton.	Height of stubble.	Grain.	Straw.	Hay.	Roots, ensilage or green feed.	Total value.	Value of crop per acre.	Profit or loss per acre.
$ c.	$ c.	$ c.	$ c.	cts.	$ c.	Ins.	Lb.	Lb.	Lb.	Lb.	$ c.	$ c.	$ c.
6 00	2 48	15 05	15 05	42·4	.....	6	2,130	6,002	.....	.....	31 40	31 40	16 35
1 04	0 72	8 04	8 04	77·8	.....	6	620	3,965	.....	.....	10 25	10 25	2 21
5 38	.....	8 74	8 74	.....	.....	.....	.....	.....	.....	.....	.....	.....	−8 74
12 42	3 20	31 83	.....	.....	.....	.....	.....	.....	.....	.....	41 65	.....	
4 14	1 06	.....	10 61	.....	.....	.....	.....	.....	.....	.....	.....	13 88	3 27

"K" (Six years' duration).

53 76	.....	106 48	29 58	.....	2 19	.....	.....	.....	.....	97,442	146 16	40 60	11 02
7 09	13 26	48 59	13 65	25·6	.....	6	11,370	18,203	.....	.....	160 70	45 14	31 49
11 98	7 26	42 73	12 21	29·4	.....	6	6,970	11,584	.....	.....	81 28	23 22	11 01
6 71	.....	28 63	8 39	.....	4 64	.....	.....	.....	12,336	.....	61 68	18 09	9 70
	.....	20 99	5 94	.....	.....	.....	.....	.....	1 horse pastured 163 days	.....	5 43	1 54	−4 40
.....	.....	21 45	5 91	.....	.....	.....	.....	.....	1 horse pastured 217 days	.....	7 23	1 99	−3 92
79 54	20 52	268 87	.....	.....	.....	.....	.....	.....	.....	.....	462 48	.....	
3 75	0 97	.....	12 66	.....	.....	.....	.....	.....	.....	.....	.....	21 78	9 12

"L" (Six years' duration).

2 86	.....	15 16	8 72	.....	4 00	.....	.....	.....	7,565	1 cow pastured 27 days	38 72	22 25	13 53
.....	.....	9 47	5 44	.....	.....	.....	.....	.....	.....	1 cow pastured 142 days	4 73	2 72	−2 72
.....	.....	9 47	5 44	.....	.....	.....	.....	.....	.....	1 cow pastured 209 days	6 96	4 00	−1 44
10 07	4 48	25 48	15 22	41·3	.....	6	3,840	9,485	.....	.....	55 94	32 15	16 93
5 84	4 69	23 77	13 66	20·2	.....	6	3,985	6,029	.....	.....	45 88	26 37	12 71
4 80	2 72	18 84	10 82	34·5	.....	6	2,615	4,445	.....	.....	30 60	17 58	6 76
23 57	11 89	103 19	.....	.....	.....	.....	.....	.....	.....	.....	182 83	.....	
2 26	1 14	.....	9 88	.....	.....	.....	.....	.....	.....	.....	.....	17 51	7 63

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ROTATION

Rotation Year.	Crops.		Area.	Items of Expense								
				Rent and manure.	Seed, twine and use of machinery.	Manual labour.		Horse labour (including teamster).				
								Hours.				
						Hours.	Cost.	Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
	1914	1915.	Ac.	$ c.	$ c.	No.	$ c.	No.	No.	No.	No.	No.
1st...	Pasture.....	Hoed crop.....	2·42	6 92	5 10	119·58	22 71	19·58	63·33	.....	6·17	.....
2nd...	Hoed crop.....	Wheat.....	2·42	6 92	10 44	6·0	1 14	.....	3·5	.....	9·25	.....
3rd...	Wheat.....	Oats...	2·42	6 92	7 93	6·75	1 28	.....	·25	2·5	12·33	.....
4th...	Oats.....	Summer-fallow	2·42	6 92	1 45	.....	.....	.....	21·17	.....	9·5	.....
5th...	Summer-fallow	Barley.....	2·42	6 92	5 65	7·0	1 33	.....	14·75	.....	14·67	.....
6th...	Barley.....	Hay.....	2·42	6 92	8 78	5·5	1 05	.....	11·75	.....	.....	.....
7th...	Hay.....	Pasture.....	2·42	6 92	8 78	.....	.....	.....	.....	.....	.....	.....
	Aggregate.....		16·94	48 44	48 13	144·83	27 51	19·58	114·75	2·5	51·92	.....
	Average per acre, 1915.....		.....	2 86	2 83	8·55	1 62	1·16	6·77	·15	3·06	.....

* 1,016 pounds sugar beets valued at $4 per ton.

SESSIONAL PAPER No. 16

"O" (Seven years' duration).

in raising Crop.							Particular of Crop.						
							Weight.						
Value of horse labour.	Cost of threshing.	Total cost.	Cost of 1 acre.	Cost for 1 bushel.	Cost for 1 ton.	Height of stubble.	Grain.	Straw.	Hay.	Roots, ensilage or green feed.	Total value.	Value of crop per acre.	Profit or loss per acre.
$ c.	$ c.	$ c.	$ c	Cts.	$ c.	Ins.	Lb.	Lb.	Lb.	Lb.	$ c.	$ c.	$ c.
29 76	.....	64 49	26 65	.....	2 38	.....	.....	.....	.....	*54,235	81 86	33 82	7 17
5 63	11 95	36 08	14 91	21·1	.....	6	10,241	17,012	.....	.....	145 05	59 98	45 07
7 04	7 91	31 08	12 84	15·7	.....	6	6,720	9,942	.....	.....	77·14	31 87	19 03
11 76	.....	20 13	8 31	.....	.....	.....	.....	.....	.....	.....	.....	.....	−8 31
12 05	5 80	31 75	13 12	27·2	.....	6	5,510	12,694	.....	.....	68 39	28 26	15 14
3 99	.....	20 74	8 57	.....	3 64	.....	.....	.....	11,385	.....	56 92	23 52	14 95
.....	.....	15 70	6 49	.....	.....	.....	.....	.....	1 cow pastured 157 days	.....	5 23	2 16	−4 33
70 23	25 66	219 97	.....	.....	.....	.....	.....	.....	.....	.....	434 59	.....	
4 15	1 52	.....	12 98	.....	.....	.....	.....	.....	.....	.....	.....	25 65	12 67

LACOMBE.

CULTURAL EXPERIMENTS.

The cultural experimental work has now been under way for five seasons on the Experimental Station at Lacombe. The results obtained in 1911 have not been considered especially valuable since that year was the first during which the various operations were conducted and was more in the nature of preparatory work.

DEPTH OF PLOUGHING.

The rotation followed on this experiment is summer-fallow, wheat, and oats.
Depth of ploughing summer-fallow to be sown to wheat.

1. Ploughing 3 inches deep.
2. Ploughing 4 inches deep.
3. Ploughing 5 inches deep.
4. Ploughing 6 inches deep.
5. Ploughing 7 inches deep.
6. Ploughing 8 inches deep.
7. Ploughing 5 inches deep, subsoil 4 inches.
8. Ploughing 6 inches deep, subsoil 4 inches.
9. Ploughing 7 inches deep, subsoil 4 inches.
10. Ploughing 8 inches deep, subsoil 4 inches.

DEPTH OF PLOUGHING STUBBLE FOR OATS.

All plots are ploughed in the fall after receiving an application of manure at the rate of 6 tons per acre.

1. Ploughing 3 inches deep.
2. Ploughing 4 inches deep.
3. Ploughing 5 inches deep.
4. Ploughing 5 inches deep.
5. Ploughing 5 inches deep.
6. Ploughing 5 inches deep.
7. Ploughing 5 inches deep.
8. Ploughing 5 inches deep.
9. Ploughing 5 inches deep.
10. Ploughing 5 inches deep.

Results have shown the most economical depths of ploughing summer-fallow to be 7 or 8 inches although ploughing 7 or 8 inches deep and subsoiling 4 inches has almost invariably given somewhat heavier yields of wheat. However, the increased yield has in most cases not been sufficient to pay for the extra cost of subsoiling.

Oats sown on fall ploughed wheat stubble land have given decidedly the best yields on the plot of land that was ploughed 8 inches deep in the summer-fallow year.

DEPTH OF PLOUGHING SOD.

The rotation followed is wheat, oats, hay, hay, manured at the rate of 8 tons per acre in autumn on first year in hay. The sod is ploughed right after the fourth year hay crop is cut and is cultivated the rest of the season.

1. Ploughing 3 inches deep, sod and stubble.
2. Ploughing 4 inches deep, sod and stubble.
3. Ploughing 5 inches deep, sod and stubble.
4. Ploughing 3 inches deep, sod, and 6 inches on stubble.

Breaking sod at depths of 3, 4, and 5 inches has proven the greatest depth to be the most economical, an average increased yield of four bushels per acre being obtained over the plot ploughed 4 inches deep.

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For oats the plot that was broken 3 inches deep, cropped and then ploughed 6 inches deep yielded but 1 bushel per acre heavier than the plot that was ploughed 5 inches deep each time. Considering the two crops together the 5-inch depth can readily be recommended for breaking from sod, since that plot has outyielded the plot 3 inches deep from sod, and backset 6 inches deep. Not having tried a greater depth than 5 inches for sod breaking, we are not prepared to say that this is the most economical depth.

This experiment has clearly demonstrated that shallow ploughing is not profitable and that there is a limit in depth when we wish to secure the most economical returns.

SUMMER-FALLOW.

A three-year rotation of summer-fallow, wheat and oats, is practised. Manure is applied at the rate of 6 tons per acre on the wheat stubble.

1. Plough 4 inches June, pack if necessary and practicable, cultivate as necessary.
2. Plough 6 inches June, pack if necessary and practicable, cultivate as necessary.
3. Plough 8 inches June, pack if necessary and practicable, cultivate as necessary.
4. Plough 4 inches June, cultivate; plough 4 inches, September, harrow.
5. Plough 6 inches June, cultivate; plough 6 inches, September, harrow.
6. Plough 8 inches June, cultivate; plough 8 inches, September, harrow.
7. Plough 6 inches June, cultivate; plough 4 inches, September, harrow.
8. Plough 4 inches June, cultivate; plough 6 inches, September, harrow.
9. Plough 4 inches June, early as possible, cultivate; plough 6 inches, September, leave untouched.
10. Plough 5 inches June, seed to rape or other green forage crop and pasture off.
11. Plough 6 inches May 15, harrow and pack if necessary, cultivate as necessary.
12. Plough 6 inches June 15, harrow and pack if necessary, cultivate as necessary.
13. Plough 6 inches July 15, harrow and pack if necessary, cultivate as necessary.
14. Fall cultivate before summer-fallowing. Plough 6 inches June, harrow and pack if necessary, cultivate as necessary.
15. Fall plough 4 inches before summer-fallowing; plough 6 inches June, harrow and pack if necessary, cultivate as necessary.
16. Plough 6 inches June, pack, cultivate as necessary.
17. Plough 6 inches June, no packing, otherwise same as other plots.

The wheat on the area devoted to this experiment lodged so badly in 1915 that it was not possible to secure any results, therefore the figures for the first part of this experiment are for a three-year period only. A single ploughing for summer-fallow has given an average of 8 bushels more wheat to the acre than where a second ploughing in September was practised. For all purposes a depth of 6 inches was most profitable. Plot 9, which is ploughed four inches deep early in June, cultivated and re-ploughed 6 inches deep in September, but then left untouched instead of harrowing after the second ploughing, as in the case of the other plots, has given somewhat heavier yields than the other plots on which two ploughings were practised. The larger yield on this plot has probably been due to a loss of moisture from the plot, thereby giving a lighter growth of straw which would ripen earlier than on the other plots; the heads thus had a chance to fill out better. This poorer method of summer-fallowing should of course be guarded against where the rainfall is not plentiful. Plot 10, which is seeded to rape and pastured off in its summer-fallow year has given an average yield of 31·5 bushels per acre, while some of the other plots have yielded over 50 bushels per acre. Granting that a crop of rape used for pasture is worth about $10 per acre, we still find a loss of income from this method of summer-fallowing. A lighter growth of straw is produced in both years after the fallow treatment, which is almost sure to stand well and ripen a little earlier than the crops on the other plots.

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Various dates of ploughing for summer-fallow have shown that the earliest ploughing gives the best results, although no very marked difference is found between plots ploughed May 15 and June 15. July 15 is decidedly too late to begin summer-fallowing, an average decreased yield of a little over four bushels per acre having resulted from beginning summer-fallow at this date as compared with beginning one month earlier.

Fall discing, an operation costing about one-half that of ploughing, has not given as heavy yields as fall ploughing at a depth of 4 inches. No depth greater than 4 inches has been tried here, but this method has resulted in the heaviest yields obtained on any plot in this experiment. Fall discing for weedy land cannot be valued according to the yields of grain secured only, but should be credited with its value in ridding the land of numerous weeds.

The results outlined above for wheat have been duplicated in the following crop of oats in almost every case. Single ploughing at a depth of 8 inches has resulted in the greatest yields among plots comparable as to depth and number of ploughings. The plot ploughed June 15 gave a slightly higher average yield of oats than the one ploughed July 15.

STUBBLE TREATMENT.

Treatment of wheat stubble to be sown to wheat:—

1. Plough, autumn.
2. Disc harrow, autumn.
3. Burn stubble, then disc, autumn.
4. Burn stubble then plough, autumn.
5. Burn stubble in spring, seed at once.
6. Plough in spring, seed at once.
7. Disc at cutting time, spring plough.
8. Disc at cutting time, autumn plough.
9. Plough, autumn, subsurface pack at once.
10. Plough, spring, seed, subsurface pack.

Treatment of wheat stubble to be sown to oats:—

11. Plough, autumn, subsurface pack at once
12. Plough, spring, seed, subsurface pack.
13. Cultivate, autumn, spring plough, seed.

A comparison of ploughing and discing in the fall has clearly demonstrated the value of the former practice since an increased yield of over seven bushels per acre has resulted from ploughing. The burning of the stubble previous to ploughing or discing in the fall did not affect the results and the advantage in favour of ploughing rather than discing in the fall was equally striking in this instance. Burning stubble in the spring has given lighter crops than fall burning, while the spring ploughing of stubble has given a substantial increase in yield over plots from which the stubble was burned and seeding done without ploughing. Autumn ploughing for wheat has in the last four seasons given 25 bushels per acre more than spring ploughing. The value of the packer after the plough was demonstrated by an average increased yield of 1·5 bushels per acre.

A comparison of the different seasons of ploughing for oats has not demonstrated any marked results. It would appear clear, however, that one is wise to do as much ploughing as possible and thus be in a position for early seeding. Fall discing has not resulted in increased yields as a rule, but is valuable in getting rid of weeds.

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SEEDING TO GRASS AND CLOVER.

Plot.	Preparation Year.	Method of Seeding.
1.	Fallow.	Seeded with wheat.
2.	Fallow.	Seeded alone.
3.	Hoed crops.	Seeded with wheat.
4.	Hoed crops.	Seeded alone.
5.	Wheat.	Seeded with wheat on stubble.
6.	Wheat.	Seeded alone.
7.	Wheat.	Seeded with oats on wheat stubble
8.	Wheat.	Seeded alone.
9.	Wheat.	Seeded with wheat.
10.	Oats.	Seeded alone.
11.	Wheat.	Seeded with wheat.

This experiment, conducted to determine the value of a nurse crop when seeding to grass and clovers, has shown that invariably a greater crop of hay results in the second year when no nurse crop was sown. The difference at this Station has not been sufficiently large to pay for the grain crop lost and in the succeeding year the difference in the yields of hay is almost negligible. The maximum yields have been obtained when seed was sown following summer-fallow or root crops.

BREAKING SOD FROM CULTIVATED GRASSES AND CLOVERS.

The rotation followed is given below:—

First year.—Seeded down, without a nurse crop, western rye grass 10 pounds, alfalfa 3 pounds, clover 3 pounds, per acre.

Second year.—Hay.

Third year.—Hay.

Fourth year.—Break.

Fifth year.—Crop, barley.

1. Plough July 20 to 30, 5 inches deep. Pack and disc at once, disc in fall.
2. Plough October, 5 inches deep, pack, disc harrow.
3. Plough early July, 3 inches deep, backset September, cultivate as necessary.
4. Stiff-tooth rip, July, plough 5 inches deep September, cultivate.
5. Spring plough 5 inches deep, seed same spring to wheat.
6. Duplicate No. 5, sow flax.
7. Repeat No. 5, sow peas.
8. Plough May 15, work as summer-fallow.

The work on breaking sod from cultivated grasses has given very decided results. Breaking at a depth of 5 inches about July 20 has given an average increased yield of fifteen bushels of barley per acre, over that grown on a similar plot ploughed in October. Ploughing early in July and backsetting in September while considerably better than late breaking was not equal to the plot broken five inches deep in July. Backsetting has not been profitable in this experiment. A stiff-tooth rip in July has been little better than leaving it untouched until breaking in October.

Of the three plots broken early in the spring and seeded to wheat, flax and peas respectively, wheat and peas have been better than flax as a first crop.

The average yield of these plots, although lower than the plot broken and cultivated in its first year, have given a sufficient crop of wheat or flax to offset the loss in crop the following year. The peas have been subject to such raids by cutworms that very few have grown on the plot. Clearly the best plot of all has been that which was ploughed on May 15, and cultivated as a summer-fallow. An average yield of 59 bushels of barley per acre has been obtained on this plot, which is 13 bushels per acre greater than that obtained on any other plot in this experiment.

LACOMBE.

Application of Barnyard Manure for Roots.

The rotation for plots 1 to 7 is hoed crop, wheat, wheat.
The rotation for plots 8 and 9 is hoed crop, wheat, summer-fallow.

1. No manure, second year stubble, ploughed in autumn.
2. Apply on surface in autumn after ploughing second year stubble, and work in at once.
3. Apply in spring on surface of ploughed land, second year stubble and work in at once.
4. Plough in autumn right after applying, second year stubble.
5. Plough in spring right after applying, second year stubble.
6. Winter apply, plough in spring, second year stubble.
7. Winter apply, green manure (cut straw) on second year stubble, plough in spring.
8. Winter apply, green manure (cut straw) on summer-fallow, disc in.
9. Summer-fallow, no manure.

The experiments dealing with the application of barnyard manure on crops have at least demontrated the value of manure applied to a soil, even as fertile as our western prairies are. For roots the manure if applied in the fall should be worked in at once, while if a top dressing alone is to be applied, it should be done in the spring. Green manure, wiuter applied, has been equal, ton for ton, to rotted manure applied under the same conditions. The practice of applying the manure direct to the land is the most economical one providing it is not too full of weed seeds. If a regular rotation is followed in which there is a year of hay and one or two years pasture, the green manure can well be applied on the first year hay stubble in the winter. Many weed seeds will germinate in the spring and die, while the stimulating effect of the manure is marked not only on the pasture, but also on the grain crops following. Green manure applied on summer-fallow has not only given the heaviest yields of any plot in this range, but has produced the largest and most uniform roots.

Application of Barnyard Manure for Wheat, Oats and Barley.

A complete experiment as outlined below is conducted with each cereal.

1. Apply in winter green manure (cut straw) first year stubble, disc in.
2. Apply in winter green manure (cut straw) summer-fallow, disc in.
3. Apply with spreader after grain sown on first year stubble.
4. Apply with spreader after grain sown on summer-fallow.
5. No manure; fall ploughed; first year stubble.
6. Apply on surface first year stubble and plough in in autumn.
7. Apply on surface first year stubble and plough in in spring.
8. No manure; disc; first year stubble.
9. No manure; burn stubble.

In these experiments where manure has been applied on wheat, oats and barley, the lowest yields were in every case recorded on the three plots where manure is not applied at any time during the rotation. The average increased value of the crops of wheat, oats and barley, due to the application of 12 tons of barnyard manure is $4.66. Since only a three-year rotation is followed, and the manure is applied on the third year crop, we have no figures available as to how long the manure would continue to give increased crops. From practical farming experience we feel certain that an

increased yield would result for at least five years. The value of the manure should not be reckoned according to the increased grain yield only, but should be credited with the increased crop of straw, which is of no mean value to the live stock farmer.

In this experiment burning the stubble and then ploughing has given a very slightly higher yield than simply discing in the fall prior to seeding. Of the dates of applying manure, the plot on which an application was made in the fall has given greater yields than the plot treated in a similar manner in the spring. However, a top dressing after the crop has been sown in the spring has given very excellent results. This latter practice is particularly beneficial on a soil that is liable to drift.

GREEN MANURING.

Eighteen plots are used for this experiment, the rotation being, first year, summer-fallow; second year, wheat; third year, oats.

1. Summer-fallow.
2. Peas, two bushels Golden Vine (or other similar variety) ploughed under early in July.
3. Peas, two bushels Golden Vine, ploughed under when in blossom.
4. Tares, 1 bushel per acre, ploughed under late July.
5. Summer-fallow, barnyard manure, 12 tons per acre, applied on summer-fallow in September.
6. Summer-fallow.

Investigations conducted to determine the value of green manures have shown that peas or tares ploughed under are not equal in value as a crop producer to twelve tons of barnyard manure. In fact, green manures at this Station have been but slightly superior to a straight summer-fallow treatment. It should be stated, however, that a very light crop of peas and tares grew on these plots in most years, and it might be expected that better results would be obtained when a strong growth of green manure is turned under.

DEPTH OF SEEDING.

The rotation followed is: summer-fallow, wheat, oats.

1. Sowing 1 inch deep.
2. Sowing 2 inches deep.
3. Sowing 3 inches deep.
4. Sowing 4 inches deep.

An experiment conducted as outlined above has shown the optimum depth of seeding for wheat to be from 3 to 4 inches deep, while for oats, a depth of from 2 to 3 inches has been best.

GREEN FEED.

Peas and oats sown at the rate of 1 bushel of peas and 2 bushels of oats to the acre have again given us a very fine crop of green feed. The feeding value of this crop, when used for ensilage, is shown in a table in the Dairy Division of the Animal Husbandry Report for this Station.

A test was conducted to determine the loss in weight due to curing and drying green feed. A load of green feed, fresh from the binder, in the condition used for silage weighed 2,560 pounds. The dry weight of the same load was 1,215 pounds, which shows a shrinkage of 52-54 per cent due to loss of moisture in curing.

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FENCING AND BREAKING.

A little over one-half mile of woven wire fence was built dividing two of the main fields on the farm. Fencing was also erected around eight blocks of land one-third of an acre in size, to be used for experimental work with hogs on pasture.

Somewhat over eighteen acres of land were broken on the west side of the farm. The roots have been picked from this land and it was well fall disced in preparation for seeding in the spring of 1916.

PASTURE VALUE OF LAND.

During the summer of 1915, 102 head of steers were pastured from May 24 until November 5 on a section of wild land. This was about the limit of the stock carrying capacity of this area which was an average section of Central Alberta wild land. From records secured on the rotations it was found that on timothy pasture about three acres were required to carry one cow for the entire season. This would place the stock carrying capacity of a section of cultivated grass land at 210 head for a season. It is evident where one requires more pasture for live stock, that the capacity can be doubled by breaking the wild land and seeding it down to some good pasture grass. The stock carrying power of Kentucky Blue grass or brome grass pasture when seeded on land similar to that at this Station will be much greater than similar land seeded with timothy and used as pasture.

EXPERIMENTAL STATION, INVERMERE, B.C.

REPORT OF THE SUPERINTENDENT, G. E. PARHAM.

WEATHER CONDITIONS.

Without doubt, the season of 1915 was the most favourable enjoyed since this Station has been in existence. Cultivation was begun by the middle of March and by the end of the month practically all the land was ready for seeding. There was a lack of moisture during the early part of April and high winds caused the light soil to drift considerably, but at the end of the month the first good rain came, and during the rest of the growing season there was an abundance of rainfall to nourish the grain crops, though irrigation was employed in August for the root crops. Even though the season was an exceptionally favourable one, the attempts to grow alfalfa under dry-farming conditions proved failures, and it does not seem that success along this line is possible.

The following weather observations were recorded at the Invermere Station during 1915:—

1915. — Month.	Temperature F.			Precipitation.				Total Sunshine.
	Highest.	Lowest.	Mean.	Rainfall.	Snow-fall.	Total.	Heaviest in 24 hours.	
	°	°	°	Inches.	Inches.	Inches.	Inches.	Hours.
January	36	−15	8·12	.....	5·125	0·51	0·20	46·0
February	44	— 5	25·73	.....	3·000	0·3	0·25	70·9
March	63	12	36·17	0·03	.....	0·03	0·03	175·8
April	75	24	47·01	1·14	.....	1·14	0·90	208·7
May	78	30	52·07	1·01	.....	1·01	0·26	168·0
June	82	35	56·21	3·92	.....	3·92	1·83	197·7
July	83	40	60·30	3·79	.....	3·79	0·73	211·4
August	89	41	68·07	0·67	.....	0·67	0·26	296·9
September	80	27	49·51	0·72	.....	0·72	0·20	151·8
October	65	23	43·90	0·90	.....	0·90	0·22	124·7
November	49	— 4	24·53	0·10	8·000	0·90	0·35	59·0
December	40	−16	21·12	0·28	3·000	0·58	0·12	43·4
Total for year	.....	.....	.....	12·56	19·125	14·47	.....	1754·3

ROTATION OF CROPS.

The four following rotations, which were first undertaken in 1914 were continued during the season of 1915.

ROTATION "A" (FOUR YEARS' DURATION).

First year.—Roots.
Second year.—Wheat.
Third year.—Peas.
Fourth year.—Oats.

The plots are of one-half acre and are irrigated as required, and an exact record of the amount of water used is recorded. The pea crop is to be ploughed under each year to supply humus to the soil.

ROTATION "B" (FIVE YEARS' DURATION).

First year.—Wheat.
Second year.—Roots.
Third year.—Oats, seeded down.
Fourth year.—Clover.
Fifth year.—Clover.

These plots are also one-half acre. The plots are irrigated as required, but no exact record of water used is made. This is mixed farming rotation which is specially chosen as likely to be specially suitable to this district.

ROTATION "C" (TWO YEARS' DURATION).

First year.—Oats.
Second year.—Summer-fallow.

This experiment has been slightly modified, so as to make greater use of the land at our disposal. One-quarter acre will be in future devoted to growing oats continuously. The remaining one-quarter acre will be divided into two plots of equal size, one being used for growing oats continuously with a dressing of farm manure as required, the other being used to raise oats with an alternate summer's bare fallow.

ROTATION "D" (TEN YEARS' DURATION)—(A DRY-FARMING ROTATION).

First year.—Summer-fallow.
Second year.—Alfalfa.
Third year.—Alfalfa.
Fourth year.—Alfalfa.
Fifth year.—Alfalfa.
Sixth year.—Summer-fallow.
Seventh year.—Hoed crop.
Eight year.—Grain.
Ninth year.—Summer-fallow.
Tenth year.—Grain.

INVERMERE.

The plots are one-quarter acre in extent with no irrigation. The alfalfa is sown in drills 28 inches apart and at the rate of 4 pounds of seed to the acre. One application of manure is made after harvesting the grain.

Although we had an exceptionally favourable season this year, the alfalfa was a commercial failure, and has definitely demonstrated that, under the local conditions of soil and climate, alfalfa cannot be successfully grown under a system of dry-farming.

Under these circumstances it has been decided that this rotation shall be discontinued and in its place the following will be adopted:

Six-year dry-farming rotation.—1, summer-fallow; 2, wheat; 3, peas and oats; 4, summer-fallow; 5, hoed crop (manured); 6, barley.

ROTATION

Plot.	Area.	Crop.	Sown.	Quantity of seed per acre.	Variety.	Manuring.		
						Date.	Kind.	Quantity.
1	½ acre	Wheat	April 15	1½ bushels	Marquis			
2	½ "	Hoed crop	May 19		21 rows mangels, 5 rows sugar beets	March 16	Farm manure.	10 ton
3	½ "	Oats	April 15	2½ bushels	Banner	October 28	Farm manure.	10 ton
4	½ "	Peas	April 16	1½ "	Golden Vine.			

ROTATION

1	½ acres	Wheat	April 15	1½ bushels	Marquis			
2	½ "	Hoed crop	May 20		21 rows turnip, 5 rows sugar beets	March 26	Farm manure.	10 ton
3	½ "	Oats (Clover seeded.)	April 15	2½ "				
			April 15	11 pounds.				
4	½ "	Clover	May 21, 1914.	11 pounds.				
5	½ "	Clover	June 23, 1914.	11 "				

ROTATION

1	¼ acre	Oats continuously	April 16	2½ bushels				
2	⅓ "	Summer-fallow.						
3	⅓ "	Summer-fallow.				April 6	Farm manure.	10 ton

ROTATION

1	¼ acres	Alfalfa						
2	¼ "	Alfalfa						
3	¼ "	Alfalfa						
4	¼ "	Summer-fallow						
5	¼ "	Hoed crop	May 20	2 pounds per acre.	Turnip Northwestern.			
6	¼ "	Barley	April 27	1½ bushels	Manchurian			
7	¼ "	Summer-fallow						
8	¼ "	Wheat	April 13	1⅓ bushels	Pioneer			
9	¼ "	Summer-fallow.						
10	¼ "	Alfalfa	July 3	4 pounds				

"A." (four years' duration).

Cultivating.		Dates of			Yield per acre.
Dates of	Operation.	Irrigating.	Cutting.	Harvesting.	
March 24	Cultivated		August 16	August 25	42·12 bushels.
September 20	Ploughed				
March 30	Ploughed		October 13		12 tons
April 8	Harrowed				
June 16	Cultivated				
August 9	"				
March 24	Harrowed		August 12	August 24	67·91 bushels
March 24	Harrowed				
July 27	Ploughed under				

"B." (five years' duration).

March 24	Cultivated	June 14	August 17	August 25	44·33 bushels
September 21	Ploughed				
March 29	Ploughed	August 10	October 18		12 tons
April 8	Harrowed				
June 16	Cultivated				
August 9	Cultivated				
March 24	Harrowed	June 17	August 9	August 25	62·17 bushels
April 6	Harrowed	May 11	July 3		
			August 26		
April 6	Harrowed	May 11	July 3		
			August 26		

"C."

March 24	Cultivated	June 17	August 9	August 24	34·59 bushels
April 15	Harrowed				
March 24	Cultivated				
April 15	Harrowed				
June 4	Cultivated				
June 22	Cultivated				

"D." (ten years' duration)—(dry farming).

March 31	Cultivating		July 5		
April 3	Harrowing		August 30		
May 4	Cultivating				
June 22	Cultivating				
March 31	Cultivating		July 5		
April 3	Harrowing		August 30		
May 4	Cultivating				
June 22	Cultivating				
March 31	Cultivating		July 5		
April 3	Harrowing		August 30		
May 4	Cultivating				
June 22	Cultivating				
March 24	Cultivated				
March 24	Cultivated				
June 16	Cultivated				
August 9	Cultivated			September 25	6 tons
March 24	Cultivated		August 4	August 27	32·5 bushels
March 24	Cultivated				
March 24	Cultivated		August 4	August 27	28·6 bushels
March 24	Cultivated				
March 24	Cultivated				
July 27	Cultivated				

TABLE showing Irrigation of Rotation "A" during season 1915.

Plot.	Irrigating.		Hours.	Inches on Weir.	Discharged Cubic feet per second.	Acre inches.	Waste in Acre inches.	Net Flow in Acre inches.	Acre inches per acre.
	Commenced.	Ended.							
1..... (Wheat)	May 10, 10 a.m...	May 10, 6 p.m....	8	4¾	·2508	2·006	·0255	1·980	3·96
	May 11, 7.30 a.m.	May 11, 9.30 a.m.	2	5	·2851	·5702	·0289	·5413	1·08
	Total.....	.....	.....	.....	.....	2·5708	·0544	2·5213	5·04
2..... (Roots)	August 12, 8 a.m....	August 12, noon.....	4	4	·1632	·6528	·0153	·6375	1·27
	August 13, 7.30 a.m.	August 13, 10 a.m...	2½	4	·1632	·4080	·0280	·3800	·76
	Total.....	.....	.....	.....	.....	1·0608	·0433	1·0175	2·03
3..... (Oats)	May 11, 10 a.m...	May 11, 6 p.m....	8	4¾	·2508	2·0060	nil.	2·0060	4·01
	May 12, 7.30 a.m.	May 12, 1 p.m....	5½	4¾	·2508	1·3794	·0153	1·3641	2·72
	Total.....	.....	.....	.....	.....	3·3854	·0153	3·3701	6·73
4..... (Peas)	May 15, 7.30 a.m.	May 15, 6 p.m....	10½	5	·2851	2·9935	·0700	2·9235	5·84
	Total.....	.....	.....	.....	.....	2·9935	·0700	2·9235	5·84

EXPERIMENTAL FARM, AGASSIZ, B.C.

REPORT OF THE SUPERINTENDENT, P. H. MOORE, B.S.A.

WEATHER CONDITIONS.

The season of 1915 was generally a good one for crop production. It was a banner year for small grain and silage corn, but somewhat too dry for the best production of root crops. The spring was early and ideal for seeding. May was warm and produced just enough gentle precipitation to keep the crops growing rapidly. These conditions prevailed until the middle of June, but the latter part of this month was fine and hot. July was extremely hot, only a few trifling showers falling. These conditions ripened the grain early and well; corn made excellent growth, but root crops began to suffer. August was one of the hottest and driest months experienced for seventeen years and was followed by an exceptionally dry September. Such conditions as these tend to make excellent corn crops but were too dry for the best development of roots. Precipitation in the autumn months was below the average.

Some Weather Observations taken at Agassiz Experimental Farm, 1915.

Month.	Temperatures.					Precipitation.			Total Sunshine.
	Maximum.		Minimum.		Mean.	Rain.	Snow.	Total.	
	Date.	°	Date.	°	°	Inches.	Inches.	Inches.	Hours.
January	20	53	26	16	37·065	7·17	.....	7·17	69·5
February	20	55	14	26	41·02	5·67	.....	5·67	69·3
March	21	73	19	30	48·11	2·45	.....	2·45	131·4
April	16	76	23 and 29	31	50·21	5·37	.....	5·37	139·6
May	4	81	1	35	54·27	5·2	.....	5· 2	131·1
June	30	91	3	42	59·44	2·36	.....	2·36	133·1
July	20	95	11 and 15	40	62·9	1·62	.....	1·62	195·00
August	21	98	5	45	66·22	·07	.....	·07	172·00
September	24	81	8	40	56·73	1·26	.....	1·26	109·6
October	3and7	68	8	33	48·07	11·26	.....	11·26	59·36
November	5	53	11, 13, 30	28	38·56	7·75	.....	7·75	34·1
December	4	52	30	18	38·01	13·79	16	15·39	23·0
						63·97	16	65·57	1,272·06

FIELD CROPS.

The four year rotation has been continued with increasing good results except for the pasture section. The mid-summer was so dry and hot that we received very small returns from the section devoted to this crop.

This season corn was grown on the same section as in 1911. The results were much more satisfactory, due to the fall ploughing and a dressing of barnyard manure. Longfellow was the main variety grown and it was supplemented by Comp-

ton's Early and Smoky Dent. The last named variety gave excellent results both from the standpoint of yield and quality. The whole corn crop in 1915 was the best quality grown since 1911.

The mangel crop was one of the best ever grown. It was grown on sod that was manured in the autumn of 1914 and that was twice ploughed and worked down during the winter. The Danish Sludstrup was the variety grown. Ten pounds of seed per acre was planted in drills 30 inches apart. The stand was perfection and the plants were thinned to 1 foot apart in the drills. On account of the dry midsummer the mangels did not grow very large but the even stand throughout made a profitable crop.

Commercial fertilizer made up of 350 pounds superphosphate, 150 pounds sulphate of potash, and 100 pounds nitrate of soda was applied to the acre. In a few check rows where this material was not used the yield was hardly one-half of the average field yield. On all of the four quarters of the farm which has been cropped to mangels it has been just a waste of labour to try to grow them without some small help by artificial manures, although this has not been the case with silage corn.

All of the first crop of clover was made into silage which made an excellent substitute for corn. It was found that, taking the weather into consideration, the land could be cleared as cheaply by making silage as it could by making hay and the resulting product was more profitable as a food for dairy cows.

The grain crop following the 1914 hoed crop was one of the best ever harvested. The seed mixture consisted of 68 pounds of oats, 30 pounds of peas, and 24 pounds of late barley per acre. With this grain 9½ pounds of early red clover, 3½ pounds of alsike clover, 1½ pounds white Dutch clover, 2 pounds Italian rye grass, and 2 pounds orchard grass was sown per acre. The stand of clover and grass was perfect in the autumn. However, the very severe winter killed some of the red clover and the Italian rye grass.

RATES OF SEEDING.

RATES OF SEEDING OATS.

Four plots were sown to test out the different quantities of seed per acre. Banner was the variety chosen for this work. The results given of course are only for one year and much further evidence will need to be obtained before any definite conclusions may be drawn. The results this year show that 4 bushels of seed per acre gave the largest yield, and the smallest yield was obtained from the smallest amount of seed per acre. The season of 1915 was an excellent one for oats and a season not so favourable may show very different results. The work is being continued.

Rates of Seeding Banner Oats.

Quantity sown.	Date of sowing.	Date of ripening.	Weight of Straw per acre.	Yield of grain per acre.	Yield of grain per acre.
Bush.			Lb.	Lb.	Bush. Lb.
3	April 9	August 4	4,965	3,075	90 15
3½	" 9	" 4	4,530	3,810	112 2
4	" 9	" 4	5,340	4,260	125 10
4½	" 9	" 4	4,170	3,630	106 16

DRAINING.

The very dry season made conditions most favourable for cleaning out the old drains near the foot of the little mountain and over 3,000 feet of work was done.

AGASSIZ.

FENCING.

Only that part which was absolutely necessary was fenced this year. Some 250 rods of woven wire fence was erected. On the west side of the avenue and from the forest belt west to the line of the west section of the farm creosoted posts were set alternating with untreated ones. The posts were treated by the brush method with hot creosote. The posts were 6-inch square cedar and the treatment was applied to see if creosote has any effect upon the longevity of this type of post.

CULTURAL INVESTIGATION.

Of the 140 permanent plots used in this investigation thirty-five were used as the hoed crop section of the four year rotation, thirty-five were used for grain, and seventy were first and second-year hay. In the autumn the plots intended for hoed crops in the season of 1916 were prepared. The results obtained this year from range three used for hoed crops were quite gratifying but it would not be well to emphasize any of the points brought out until the same preparation and methods have been used on ranges four, five, and six. It might be mentioned, however, that in the method of preparing land for hoed crops, in the case of mangels, manure applied in the early fall on the sod, the land ploughed shallow, top-worked and re-ploughed late and deep, gave practically the same results as the same treatment of land with the manure applied in the winter. Plots receiving the same working with the manure applied in the spring did not give as good results. Control plots treated in the same manner, which did not receive any manure, gave only one-fourth the crop of mangels.

Referring to the different methods of applying commercial fertilizer to a mangel crop, the mixture used was 350 pounds superphosphate, 150 pounds sulphate of potash, 100 pounds nitrate of soda, per acre. In one section this fertilizer was applied in the drills, in another it was sown broadcast and before the drills were made, and in the third it was applied in the drills, but one-half of the nitrate was withheld and applied after the mangels had been thinned. There was little variation in the crop produced by the three methods. The two applications of nitrate gave slightly higher returns but not enough to pay for the extra cost of labour. In the case of the corn crop the difference between applying the fertilizer in hills or broadcast was very slight.

The results quoted are the most outstanding but as before stated they must not be taken as conclusive evidence.

LAND CLEARING.

Almost 3 acres of land was cleared and partially stumped during the year. This work was done at odd times when it was too wet to work on the land. There was also underbrushing done on 2 more acres. Seven acres of the land which was cleared during 1914 produced an excellent crop of grain and had a perfect stand of clover in the autumn. This new piece is in pasture for the 1916 season and will be in hoed crop in 1917. On the portion of this land where the blasting was intentionally heavy and where the burning was done indiscriminately, the grain crop was poor and the catch of clover almost a failure.

EXPERIMENTAL STATION FOR VANCOUVER ISLAND, SIDNEY, B.C.

REPORT OF THE SUPERINTENDENT, LIONEL STEVENSON, B.S.A., M.S.

The field husbandry work at this Station during the past year has been largely the growing of feeds for the farm stock. The clearing of roots and stones from the land not being completed, no definite rotation work was started during the past year. The areas set apart for definite rotation work reached a stage of development by the close of the year that will permit the rotation work being started during the spring of 1916.

CHARACTER OF THE SEASON.

The season was a very favourable one for hay and grains. The spring opened very early and gave opportunity for early seeding. The precipitation during the early part of the growing season was sufficient for the needs of the plants, and the temperatures very favourable to the development, the ripening or curing and the harvesting of grasses, clovers and cereals. July and August were very dry months with high temperatures, giving a condition of soil dryness that checked the development of the root and corn crops.

Some Weather Observations taken at the Experimental Station for Vancouver Island.

Month.	Temperature F.			Precipitation.				Total Sunshine
	Mean.	Highest.	Lowest.	Rainfall.	Snowfall.	Total.	Heaviest in 24 hours.	
	°	°	°	Inches.	Inches.	Inches.	Inches.	Hours.
January	38·50	49·0	27·5	2·77		2·77	·56	70·4
February	41·60	51·0	31·0	1·66		1·66	·35	65·9
March	47·0	64·0	35·0	1·65		1·65	·40	142·7
April	51·0	70·0	35·0	1·65		1·65	·69	223·4
May	55·0	75·5	40·0	2·06		2·06	·36	181·2
June	59·95	86·0	46·0	0·74		0·74	·26	304·0
July	63·39	92·0	45·0	1·30		1·30	·83	297·2
August	65·0	90·5	48·0	·03		·03	·03	274·6
September	54·59	72·0	42·0	·30		·30	·30	191·1
October	50·30	62·0	39·0	4·17		4·17	·68	104·1
November	40·80	53·0	30·0	4·82		4·82	·59	70·9
December	39·05	51·0	26·0	6·89		6·89	1·21	58·6
Total for year						28·04		1,984·1
Average for year						2·33		165·4
Total for eight growing months, March to October						11·90		
Average for eight growing months, March to October						1·49		

OATS.

Forty-four acres that had been cleared of its virgin forest growth during the previous two years was prepared for the growing of oats. Victory oats were sown on this area at the rate of 2 bushels per acre. The dates of seeding ranged from April 19 to May 15; as a portion of the area was prepared it was sown. A disc drill was used in seeding. Twenty acres of the area was seeded with red clover at the rate of 8 pounds per acre. Thirty-six acres of the crop was harvested between August 3 and August 10, and threshed on August 15. A yield of 33⅓ bushels of grain and 3,100 pounds of straw per acre was obtained. Eight acres of the latest seeded portions were cut for hay, and yielded 2,700 pounds of oat hay per acre. An excellent stand of clover was secured on the portion of the area seeded to clover. Two acres of the area were seeded to rape at the same time that the oats were sown. The rape seed germinated and the plants grew luxuriantly until the dry weather of July set in. The plants did not make any appreciable growth after the oat crop was removed in August; they lived through the winter and were in good condition in March to start growth again.

Sidney.

DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

REPORT

FROM THE

DIVISION OF ANIMAL HUSBANDRY

ON

BEEF CATTLE, DAIRY CATTLE AND DAIRYING, HORSES, SHEEP AND SWINE

FOR THE FISCAL YEAR ENDING MARCH 31, 1916.

PREPARED BY

The Dominion Animal Husbandman, Central Farm, Ottawa, Ont.	E. S. Archibald, B.A., B.S.A.
Superintendent—	
Experimental Station, Charlottetown, P.E.I.	J. A. Clark, B.S.A.
Experimental Farm, Nappan, N.S.	W. W. Baird, B.S.A.
Experimental Station, Kentville, N.S.	W. S. Blair.
Experimental Station, Fredericton, N.B.	W. W. Hubbard.
Experimental Station, Ste. Anne de la Pocatière, P.Q.	J. Bégin.
Experimental Station, Cap Rouge, P.Q.	Gus. A. Langelier.
Experimental Station, Lennoxville, P.Q.	J. A. McClary.
Experimental Farm, Brandon, Man.	W. C. McKillican, B.S.A.
Experimental Farm, Indian Head, Sask.	W. H. Gibson, B.S.A.
Experimental Station, Rosthern, Sask.	W. A. Munro, B.A., B.S.A.
Acting Superintendent—	
Experimental Station, Scott, Sask.	M. J. Tinline, B.S.A.
Superintendent—	
Experimental Station, Lethbridge, Alta.	W. H. Fairfield, M.S.
Experimental Station, Lacombe, Alta.	G. H. Hutton, B.S.A.
Experimental Station, Invermere, B.C.	G. E. Parham.
Experimental Farm, Agassiz, B.C.	P. H. Moore, B.S.A.
Experimental Station, Sidney, B.C.	L. Stevenson, B.S.A., M.S.

REPORT

FROM THE

DIVISION OF ANIMAL HUSBANDRY

OTTAWA, March 31, 1916.

The Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit, herewith, reports upon the beef-cattle, dairy-cattle and dairying operations, horses, sheep and swine on the Central Experimental Farm and branch Farms and Stations, for the past year.

A very successful year may be reported for the live stock work on all the Experimental Farms. With but few exceptions, conditions, both as to the housing, feeding and general management of the stock, were superior to any previous year. The crops were, as a rule, very good and the live stock went into winter quarters in such good condition as to be most profitably maintained during the winter months.

The live-stock work on the branch Farms and Stations is under the direct supervision of the Superintendents, who have compiled the branch Farm reports included herewith.

For assistance in preparing and compiling a large portion of the data contained in the text of the Central Experimental Farm report, I am indebted to Mr. G. B. Rothwell, first assistant, and to Mr. G. W. Muir, second assistant. Special credit is due Mr. Rothwell for the most successful year with swine, over which department he has direct charge. To Mr. Muir special credit is due for his most excellent work in conducting experiments in the feeding of dairy cattle, the testing of milking machines, and similar work, together with the keeping of the breeding records.

To Mr. Robt. Cunningham, herdsman at the Central Farm, I am particularly indebted for his constant and efficient care of live stock and for the interest and thoroughness which he has continually shown in conducting experiments with dairy and beef cattle and sheep. Special credit is also due Mr. Cunningham for the excellent records of production which have been made by all breeds of dairy cattle.

To Mr. D. D. Gray, farm foreman, I am particularly indebted for great assistance in facilitating much of the routine work.

Mr. Jos. Meilleur, dairyman at the Central Farm, has continued to do excellent work and to keep careful and accurate records in the dairy.

Mr. Fred. Read, herdsman over the swine department, deserves credit for the efficient manner in which both routine and experimental work with swine were conducted.

Mr. John Nevins, in charge of the horse stable, also has earned credit for the splendid condition in which the horses were kept and also for the careful data collected from horse-feeding trials.

Mr. O. Johnson deserves special mention for the very efficient manner in which he has conducted the work in the office, which includes an increasingly heavy correspondence and the keeping of records and accounts. Mr. R. R. McKibbin, stenographer in this Division, also should be mentioned for the most satisfactory work which he has done.

Although not under the jurisdiction of this Division, I wish to acknowledge especially the work done by Mr. R. V. Nicholson in the preparing and completing of many plans of farm buildings, intended not only for the Experimental Farms System, but even more for general distribution amongst the farmers throughout Canada. Under my supervision, Mr. Nicholson has prepared plans and made blue-prints numbering 843, which, with a large number of specifications and lumber lists, have been widely distributed. Already many excellent barns have been built along the lines of these plans and specifications, and to the entire satisfaction of the owners. This is a line of work which is extremely important in Canada, since animals are of necessity housed a considerable portion of the year, due to the cold winters. Poor, ill-ventilated, dark, unsanitary and uncomfortable buildings are undoubtedly a means of propagating and distributing many of our contagious animal diseases. Assistance to farmers, in correcting the inefficiency of their buildings, must undoubtedly be a great influence toward healthier cattle and a smaller percentage of loss and mortality.

During the year a large number of circulars have been published by this Division, together with many articles for *Seasonable Hints*, the *Agricultural Gazette*, and Canadian farm journals. My two assistants and myself have attended a large number of meetings and judged at various exhibitions throughout Canada. I have also visited, at least once, each of the branch Farms and Stations, where live-stock work is being conducted, both in the eastern and western provinces, and, in co-operation with the Superintendents of these Farms and Stations, under the direction of yourself, have started many new lines of live-stock experimental work.

I have the honour to be, sir,
Your obedient servant,

E. S. ARCHIBALD,
Dominion Animal Husbandman.

BEEF CATTLE.

CENTRAL EXPERIMENTAL FARM, OTTAWA, ONT.

REPORT OF THE DOMINION ANIMAL HUSBANDMAN,

E. S. ARCHIBALD, B.A., B.S.A.

Again it must be reported that no breeding herds of beef cattle were maintained on the Central Experimental Farm, owing to the lack of pasturage, forage crops, and the buildings necessary for such work. This is a branch of live stock work which should receive far greater attention than is at present given, for not only are the numbers of beef cattle throughout Canada decreasing, but the quality also shows a marked decline.

To illustrate good quality of beef in a small way, particularly for the many visitors to this Farm during the summer months, a number of Shorthorn calves were purchased during the latter part of this fiscal year to be finished during the summer. These will be used for illustration purposes and marketed as baby beef. A report on this work will be contained in the annual report for the fiscal year ending March 31, 1917.

EXPERIMENTAL STATION, CHARLOTTETOWN, P.E.I.

REPORT OF THE SUPERINTENDENT, J. A. CLARK, B.S.A.

BEEF CATTLE.

A bunch of steers was purchased from drovers who brought them from the north side of the province. The average price paid was $5.63 per 100 pounds. These were allowed to run on rape and pasture for two weeks. They were dehorned on October 27. The horns healed well and gave no trouble.

The following experiments were started on November 1, 1915: I. Beef *vs.* dairy type of feeders. II. Proportion of roots and grain for maximum gains.

The steers were divided into five lots as follows:—

	Average weight. Lb.
Lot I Beef Type	852
Lot II Dairy "	845
Lot III Beef "	837
Lot IV Dairy "	829
Lot V Dairy "	1,103

The meal mixture was mixed as follows:—

—	First month	Next two months	Finishing period.	Whole period.
	%	%	%	%
Bran	50·2	55·6	53·0	53·59
Barley	33·6	23·8	16·2	23·84
Oats	16·2	20·6	30·8	22·57

The bran was fed as required to keep the steers that received the least roots in a normal, healthy condition. A large proportion of barley was fed because it was available for feed, the public demand for pure seed oats being much greater than for barley.

FOOD VALUES.

The grain was valued at $29 per ton; the bran cost $23.90 per ton; roots and corn were valued at $2 per ton; mixed hay was valued at $10 per ton; oat hay, $5 per ton, and oil cake cost $2.10 per hundred pounds.

The average ration fed to the several lots for the three periods in the test, per steer per day, is here given:—

Lot.	First Month.		Next Two Months.		Finishing Period.	
	Roots and Corn Stover.	Meal.	Roots and Corn Stover.	Meal.	Roots.	Meal.
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
I	56	3	55	5½	23	9
II	56	3	55	5½	23	9
III	56	3	49	5½	22	9
IV	56	3	49	5½	22	9
V	56	3	51	5½	20	7½[1]

[1]NOTE.—During finishing period each steer in Lot V received 0·23 pound. oil cake per day; 12 pounds of hay was fed alike to all steers.

The test started November 1, and the 19 steers were sold separately at auction, March 8, 1916, at prices ranging from 7⅞ to 8⅝ cents per pound, live weight, weighed on the Station Fairbanks scales after sixteen hours' fast. The following is a detailed statement of the different lots fed:—

Lot I.

Two steers in this lot were good thrifty beef cattle; one was fair, and one was rangy. They made good gains and the rangy steer killed much better than he looked.

Number of steers in lot		4
First weight, gross	Lb.	3,410
First weight, average	"	852·5
Finished weight, gross	"	4,620
Finished weight, average	"	1,155
Total gain in 130 days	"	1,210
Average gain per steer	"	302·5
Daily gain per steer	"	2·33
Daily gain per lot	"	9·3
Gross cost of feed	$	92·21
Cost of one pound gain	c.	7·60
Value of beef at beginning, 3,410 pounds at 6·2 cents	$	211·42
Total cost to produce beef	$	303·63
Selling price at 7·966 cents per pound	$	368·02
Profit	$	64·39
Profit per steer	$	16·09
Average valuation of steer at start	$	52·85
Average sale price per steer at finish	$	92·00
Average increase in value	$	39·15
Average cost of feed per steer	$	23 05
Amount of meal eaten by lot: crushed grain, 1,445 bran, 1,651	lb.	3,096
Amount of roots eaten by lot	"	21,505
Amount of corn stover eaten by lot	"	2,380
Amount of hay eaten by lot: Clover hay	"	5,029
Oat hay	"	1,000

Lot II.

The four steers in this lot were good Holstein grades, rather smooth for average dairy type.

Number of steers in lot		4
First weight, gross	lb.	3,380
First weight, average	"	845
Finished weight, gross	"	4,460
Finished weight, average	"	1,115
Total gain in 130 days	"	1,080
Average gain per steer	"	270
Daily gain per steer	"	2·08
Daily gain per lot	"	8·3
Gross cost of feed	$	92 25
Cost of one pound gain	c.	8·50
Value of beef at beginning, 3,380 pounds at 6·15 cents	$	207 87
Total cost to produce beef	$	300 12
Selling price at 7·884 cents per pound	$	351 62
Profit	$	51 50
Profit per steer	$	12 87
Average valuation of steer at start	$	51 97
Average sale price per steer at finish	$	87 90
Average increase in value	$	35 93
Average cost of feed per steer	$	23 06
Amount of meal eaten by lot—crushed grain, 1,447, bran, 1,648	lb.	3,095
Amount of roots eaten by lot	"	21,525
Amount of corn stover eaten by lot	"	2,380
Amount of hay eaten by lot—clover hay, 5,053, oat hay, 960	"	5,053 960

CHARLOTTETOWN.

Lot III.

Three of the steers in this lot showed fair Shorthorn breeding. The fourth steer, No. 49, was weak in constitution and made the poorest gain of any steer fed. He received quite a setback by breaking a window one stormy night and getting a bad chill.

Number of steers in lot		4
First weight, gross	lb.	3,350
First weight, average	"	837·5
Finished weight, gross	"	4,340
Finished weight, average	"	1,085
Total gain in 130 days	"	990
Average gain per steer	"	247·5
Daily gain per steer	"	1·9
Daily gain per lot	"	7·61
Gross cost of feed	$	89 56
Cost of one pound gain	c.	9 05
Value of beef at beginning, 3,350 pounds at 6 cents	$	201 00
Total cost to produce beef	$	290 56
Selling price at 7·822 cents per pound	$	339 42
Profit	$	48 86
Profit per steer	$	12 21
Average valuation of steer at start	$	50 25
Average sale price per steer at finish	$	84 85
Average increase in value	$	34 60
Average cost of feed per steer	$	22 39
Amount of meal eaten by lot—crushed grain, 1,418, bran, 1,635	lb.	3,053
Amount of roots eaten by lot	"	19,780
Amount of corn stover eaten by lot	"	2,380
Amount of hay eaten by lot—clover hay, 4,959, oat hay, 1,000	"	5,959

Lot IV.

The steers in this lot were mixed dairy grades. They were excitable but thrifty and apparently a few months younger than the other pens.

Number of steers in lot		4
First weight, gross	lb.	3,315
First weight, average	"	829
Finished weight, gross	"	4,435
Finished weight, average	"	1,109
Total gain in 130 days	"	1,120
Average gain per steer	"	280
Daily gain per steer	"	2·15
Daily gain per lot	"	8·61
Gross cost of feed	$	90 36
Cost of one pound gain	c.	8 06
Value of beef at beginning, 3,315 pounds at 6 cents	$	198 90
Total cost to produce beef	$	289 26
Selling price at 8·06 cents per pound	$	357 49
Profit	$	68 23
Profit per steer	$	17 06
Average valuation of steer at start	$	49 72
Average sale price per steer at finish	$	89 37
Average increase in value	$	39 65
Average cost of feed per steer	$	22 59
Amount of meal eaten by lot—crushed grain, 1,445, bran, 1,650	lb.	3,095
Amount of roots eaten by lot	"	19,810
Amount of corn stover eaten by lot	"	2,380
Amount of hay eaten—clover hay, 5,001, oat hay, 1,000	"	6,001

Lot V.

Three rangy Holstein grades formed the fifth group. They were a year older than the other steers and were off their feed several times during the winter, due probably to their warmer quarters.

Number of steers in lot	3
First weight, gross ..lb.	3,310
First weight, average .."	1,103
Finished weight, gross .."	4,210
Finished weight, average .."	1,403
Total gain in 130 days .."	900
Average gain per steer .."	300
Daily gain per steer .."	2·3
Daily gain per lot .."	6·92
Gross cost of feed ..$	71 88
Cost of one pound gain ..c.	7 98
Value of beef at beginning, 3,310 pounds at 6½ cents ..$	215 15
Total cost to produce beef ..$	287 03
Selling price at 8·08 cents per pound ..$	340 20
Profit ..$	53 17
Profit per steer ..$	17 72
Average valuation of steer at start ..$	71 71
Average sale price per steer at finish ..$	113 40
Average increase in value ..$	41 69
Average cost of feed per steer ..$	23 96
Amount of meal eaten by lot—crushed grain, 1,116 bran, 1,223, oil cake, 63½ ..lb.	2,403·5
Amount of roots eaten by lot .."	15,853
Amount of corn stover eaten by lot .."	1,713
Amount of hay eaten—clover hay, 4,077, oat hay, 720 .."	4,797

METHOD OF WORK.

FEEDING.

The short preliminary pasture period on rape put the steers in such good, thrifty condition that when stabled they made very rapid gains. The cost of pasture and preliminary feed was added to the original cost and the value, per pound, at the beginning of the test was worked out by dividing the weight of the steers on November 1 by the total cost to that date. Lots I, II, III, and IV were fed in box-stalls in the sheep shed. They were allowed to run out in paddocks during the fine weather and always had an abundance of fresh air, the upper sections of a number of the doors being open practically every day. These conditions seem very favourable for fattening steers. Lot V was fed in a box-stall in the main barn, where the temperature was always above freezing. They were frequently too warm and required much more attention, as they went off their feed several times during the early winter. The roots were fed round, in two feeds a day, during the first two months. The first hay fed was of only fair quality timothy and late oats cured for hay. After several cases of indigestion, this was changed to good mixed timothy and clover hay, which was fed in three feeds each day. From New Years on, the turnips were pulped, mixed with the meal, and fed in two feeds, morning and evening. Water was supplied as required. During the finishing period mangels were the roots fed. They were gradually reduced as the quantity of meal was increased.

STEER FEEDING EXPERIMENT.—Table of Weights and Gains.

Lot No. 1. Tag No.	First weight.	Value, Nov. 12 1915.	Weight after 16 hours fast March 8, 1916.	Price paid.	Value.	Gain.		Dressed weight.	% Dressed weight.
						In weight	In value.		
	Lb.	$ cts.	Lb.	cts.	$ cts.	Lb.	$ cts.	Lb.	%
Lot No. 1—									
48	910	56 42	1,285	7⅞	101 19	375	44 77	695	54·5
31	790	48 98	1,120	8⅜	93 80	330	44 82	617	54·6
33	850	52 70	1,105	8⅛	89 78	255	37 08	591	53·5
35	860	53 32	1,110	7½	83 25	250	29 93	595	54·5
Total	3,410	211 42	4,620	.....	368 02	1,210	56 60	2,498	.....
Average	852·5	52 85	1,155	7·96	92 00	302½	39 15	624½	54·3
Lot No. 2—									
36	930	57 20	1,210	8⅛	98 31	280	41 11	647	53·5
34	810	49 81	1,120	7⅞	88 20	310	38 39	584	52·1
30	800	49 20	1,080	7⅞	85 05	280	35 85	542	50·2
39	840	51 66	1,050	7⅝	80 06	210	28 40	545	51·9
Total	3,380	207 87	4,460	.....	351 62	1,080	143 75	2,318	.....
Average	845	51 97	1,115	7·88	87 90	270	35 94	579½	51·9
Lot No. 3—									
45	830	49 80	1,105	8¼	91 16	275	41 36	625	55·5
47	820	49 20	1,120	8⅛	91 00	300	41 80	648	57·6
32	820	49 20	1,095	7⅜	80 76	275	31 56	630	57·5
49	880	52 80	1,020	7½	76 50	140	23 70	603	58·8
Total	3,350	201 00	4,340	.....	339 42	990	138 42	2,506	
Average	837½	50 25	1,085	7·82	84 85	247½	34 60	626½	57·3
Lot No. 4—									
44	875	52 50	1,160	8¼	95 70	285	43 20	625	52·7
37	880	52 80	1,175	7⅞	92 53	295	39 73	640	54·5
46	760	45 60	1,010	8⅛	82 06	250	36 46	560	55·5
41	800	48 00	1,090	8	87 20	290	39 20	600	55·0
Total	3,315	198 90	4,435	.....	357 49	1,120	158 59	2,425	.....
Average	829	49 72	1,109	8·06	89 37	280	39 65	606	54·5
Lot No. 5—									
43	1,150	74 75	1,475	8	118 00	325	43 25	848	58·3
42	1,130	73 45	1,360	8¼	112 20	230	38 75	781	57·4
38	1,030	66 95	1,375	8	110 00	345	43 05	761	55·3
Total	3,310	215 15	4,210	.....	340 20	900	125 05	2,390	.....
Average	1,103	71 71	1,403	8·08	113 40	300	41 68	796	57·0

DEDUCTIONS FROM EXPERIMENTS.

In comparing the data gathered during the few years' work, the results would indicate that, even with the increased cost of feeders and feeding material, much better profits can be obtained by feeding steers of better quality than the average feeder and stocker that has been offered in the province. In former years, with a few individual exceptions, average cattle have been purchased and fed at this Station. The cattle fed during the past season were selected by the Superintendent from fairly large lots that had been bought by the drovers in some of the best beef sections of the province. They were much above average feeders. Three steers, Nos. 35, 37, and 49, in the above table of weights and gains, would represent fairly well the average feeders offered in the autumn of 1915.

CHARLOTTETOWN.

Steer feeding provides a profitable way of disposing of the cheap roughages of the farm and of returning to the soil of the farm as a most valuable fertilizer the essential ingredients that are needed to make the farms of this province double their present productiveness. Dehorned stockers or feeders are worth at least one-quarter cent per pound more than horned cattle for feeding purposes. Calves intended for beef purposes should be dehorned with caustic potash as soon as the young horn can be felt.

FINANCIAL STATEMENT.

Returns.

19 steers, 22,140 pounds at 7⅞ to 8⅞ cents per pound..	$1,763 03	
Carcass steer No. 40, Dec. 29, $21.75; hide, $9.28.	31 03	
		$1,794 06

Expenditures.

Twenty steers..	$1,082 74	
Pasturage, etc..	6 80	
Hay, 13 tons, 948 pounds at $10 per ton..	134 74	
Turnips, 50 tons, 1,065 pounds at $2 per ton..	101 06	
Corn stover, 5 tons, 1,690 pounds at $2 per ton.. ..	11 69	
Bran, 4 tons, 1,162 pounds at $23.90 per ton..	109 49	
Oats (crushed), 4 tons, 28 pounds, at $29 per ton.. ..	116 40	
Oil cake, 76 pounds at 2·1 cents per pound..	1 60	
Oat hay, 2 tons, 920 pounds at $5 per ton..	12 30	
		1,576 82
Net balance from beef cattle, profit..		$217 24

Steer No. 40 was accidentally killed in drenching with purgatives.

EXPERIMENTAL FARM, NAPPAN, N.S.

REPORT OF THE SUPERINTENDENT, W. W. BAIRD, B.S.A.

BEEF CATTLE EXPERIMENT, WINTER 1915-16.

A smaller number of steers than usual were fed owing to the increase in the dairy stock. Sixteen steers were purchased, locally, during November, 1915, costing on an average 6¼ cents per pound. Well-bred feeders of good quality were not very plentiful, consequently the price was high for that season of the year. In fact the market was somewhat keener than for the same period the previous year, but during February, March and first of April the market was slow. The majority of the good stuff sold at 7 and 7½ cents; a few, extra good, brought 8 to 8¼ during the Easter market, with no advance in the price of hides. During the last of April and May the price of beef was about a dollar per hundredweight stronger than last year.

All steers purchased were well-bred Shorthorns. Eight were selected in such condition that they could be classed as good butchers; the remaining eight were somewhat thinner, hence could be classed as good stockers.

The sixteen were divided into two main lots, namely, eight good butchers and eight good stockers. These in turn were divided into sub-lots for feeding as follows: Lot 1, four good butchers; lot 2, four good stockers; lot 3, four good butchers; lot 4, four good stockers.

These were fed as follows: Lots 2 and 3 were fed 50 per cent more roots and meal than lots 1 and 4, respectively; half of lots 1, 2, 3, and 4 received, in addition to their regular ration, 2 pounds of molasses per steer per day.

The steers were tested the first of December and dehorned on the 14th. The effect from dehorning was very slight, as all heads healed very quickly, and in three days time the steers were all feeding as usual.

The test was started on the 1st of January, 1916, and ended on the 3rd of April. It is a duplication of the work carried on during the past three years. The following tables give the results obtained:—

STEER FEEDING EXPERIMENT FROM JANUARY 1, 1916, TO APRIL 3, 1916.

COMPARISONS OF LOTS 3 AND 1: GOOD BUTCHERS; HEAVY-FED VS. LIGHT-FED.

		Lot 3 4 steers "Heavy Fed"	Lot 1 4 steers "Light Fed"
Total live weight of steers, Jan. 1, 1916	lb.	4,478	4,418
Total live weight of steers, April 3, 1916	"	5,355	5,135
Increase to April 3, 1916	"	877	717
Lot 3—			
Original weight of 4 steers, 4,478 pounds at 6¼ cents	$	279 88	.....
Weight at finish of 4 steers, 5,355 pounds at 8·1 cents	$	433 76	.....
Lot 1—			
Original weight of 4 steers, 4,418 pounds at 6¼ cents	$	.....	276 13
Weight at finish of 4 steers, 5,135 pounds at 8·1 cents	$	.....	415 94
Gross profit	$	153 88	139 81
Amount of hay consumed	lb.	5,580	5,580
Amount of meal consumed	"	3,618	2,412
Amount of roots consumed	"	17,354·4	11,569·6
Amount of molasses consumed	gal.	26·09	26·09
Cost of feed for lot for ninety-three days	$	99 16	75 29
Net profit	$	54 72	64 52
Daily rate of gain per steer	lb.	2·358	1·927
Cost per 1 pound gain	cts.	11·31	10·50
Cost of feed per day per steer	"	26 66	20·24
Profit per steer	$	13 68	16 13

Comparisons of Lots 2 and 4; Good Stockers; Heavy-fed vs. Light-fed.

		Lot 2 4 steers "Heavy Fed"	Lot 4 4 steers "Light Fed"
Total live weight of steers, Jan. 1, 1916	lb.	4,573	4,206
Total live weight of steers, April 3, 1916	"	5,295	4,880
Increase to April 3, 1916	"	722	674
Lot 2—			
Original weight of 4 steers, 4,573 pounds at 6¼ cents	$	285 81	.....
Weight at finish of 4 steers, 5,295 pounds at 8·1 cents	$	428 90	.....
Lot 4—			
Original weight of 4 steers, 4,206 pounds at 6¼ cents	$	.....	262 88
Weight at finish of 4 steers, 4,880 pounds at 8·1 cents	$	.....	395 28
Gross profit	$	143 09	132 40
Amount of hay consumed	lb.	5,580	5,580
Amount of meal consumed	"	3,618	2,412
Amount of roots consumed	"	17,354·4	11,569·6
Amount of molasses consumed	gal.	26·09	26·09
Cost of feed for lot for 93 days	$	99 16	75 29
Net profit	$	43 93	57 11
Daily rate of gain per steer	lb.	1·941	1·811
Cost of 1 pound gain	cts.	13·73	11·17
Cost of feed per day per steer	"	26·66	20·24
Profit per steer	$	10 98	14 28

Comparisons of Sub-lots 1; Good Butchers; Light-fed.

——		Molasses.	No Molasses.
Total live weight of steers, Jan. 1, 1916	lb.	2,100	2,318
Total live weight of steers, April 3, 1916	"	2,535	2,605
Increase to April 3, 1916	"	435	287
Molasses—			
Original weight of 2 steers, 2,100 pounds at 6¼ cents	$	131 25	.....
Weight at finish of 2 steers, 2,535 pounds at 8·1 cents	$	205 34	.....
No Molasses—			
Original weight of 2 steers, 2,318 pounds at 6¼ cents	$	.....	144 88
Weight at finish of 2 steers, 2,605 pounds at 8·1 cents	$	.....	211 01
Gross profit	$	74 09	66 13
Amount of hay consumed	lb.	2,790	2,790
Amount of meal consumed	"	1,206	1,206
Amount of roots consumed	"	5,784·8	5,784·8
Amount of molasses consumed	gal.	22·1	.....
Cost of feed for lot for 93 days	$	39 45	35·03
Net profit	$	34 64	31·10
Daily rate of gain per steer	lb	2·34	1·54
Cost of 1 pound gain	cts.	9·07	12·21
Cost of feed per day per steer	"	21 21	18·83
Profit per steer	$	17 32	15·55

Comparison of Sub-lots 2; Good Stockers; Heavy-fed.

		Molasses.	No Molasses.
Total live weight of steers, Jan. 1, 1916	lb.	2,220	2,386
Total live weight of steers, April 3, 1916	"	2,570	2,725
Increase to April 3, 1916	"	350	339
Molasses—			
Original weight of 2 steers, 2,220 pounds at 6¼ cents	$	138 75	.....
Weight at finish of 2 steers, 2,570 pounds at 8·10 cents	$	208 17	.....
No Molasses—			
Original weight of 2 steers, 2,386 pounds at 6¼ cents	$	.....	149 13
Weight at finish of 2 steers, 2,725 pounds at 8·10 cents	$	.....	220 73
Gross profit	$	69 42	71 60
Amount of hay consumed	lb.	2,790	2,790
Amount of meal consumed	"	1,809	1,809
Amount of roots consumed	"	8,677·2	8,677·2
Amount of molasses consumed	gal.	22·1	.....
Cost of feed for lot for 93 days	$	51 40	46 98
Net profit	$	18 02	24 62
Daily rate of gain per steer	lb.	1·88	1·82
Cost of 1 pound gain	cts.	14 69	13 85
Cost of feed per day per steer	"	27 63	25 26
Profit per steer	$	9 01	12 31

Comparison of Sub-lots 3; Good Butchers; Heavy-fed.

		Molasses.	No Molasses.
Total live weight of steers, Jan. 1, 1916	lb.	2,243	2,268
Total live weight of steers, April 3, 1916	"	2,730	2,625
Increase to April 3, 1916	"	487	357
Molasses—			
Original weight of two steers, 2,243 pounds at 6¼ cents	$	140 19	.....
Weight at finish of two steers, 2,730 pounds at 8·10 cents	$	221 13	.....
No Molasses—			
Original weight of two steers, 2,268 pounds at 6¼ cents	$	.....	141 75
Weight at finish of two steers, 2,625 pounds at 8·10 cents	$	.....	212 63
Gross profit	$	80 94	70 88
Amount of hay consumed	lb.	2,790	2,790
Amount of meal consumed	"	1,809	1,809
Amount of roots consumed	"	8,677·2	8,677·2
Amount of molasses consumed	gal.	22·1	.....
Cost of feed for lot for 93 days	$	51 40	46 98
Net profit	$	29 54	23 90
Daily rate of gain per steer	lb.	2·62	1·92
Cost of 1 pound gain	cts.	10·55	13·16
Cost of feed per day per steer	"	27·63	25·26
Profit per steer	$	14 77	11 95

Comparison of Sub-lots 4; Good Stockers; Light-fed.

		Molasses.	No Molasses.
Total live weight of steers, Jan. 1, 1916	lb.	2,071	2,135
Total live weight of steers, April 3, 1916	"	2,410	2,470
Increase to April 3, 1916	"	339	335
Molasses—			
Original weight of two steers, 2,071 pounds at 6¼ cents	$	129 44	.....
Weight at finish of two steers, 2,410 pounds at 8·10 cents	$	195 21	.....
No Molasses—			
Original weight of 2 steers, 2,135 pounds at 6¼ cents	$	.....	133 44
Weight at finish of two steers, 2,470 pounds at 8·10 cents	$	.....	200 07
Gross profit	$	65 77	66 63
Amount of hay consumed	lb.	2,790	2,790
Amount of meal consumed	"	1,206	1,206
Amount of roots consumed	"	5,784·8	5,784·8
Amount of molasses consumed	gal.	221	.....
Cost of feed for lot for 93 days	$	39 45	35 03
Net profit	$	26 32	31 60
Daily rate of gain per steer	lb.	1·82	1·80
Cost of 1 pound gain	cts.	11·64	10·46
Cost of feed per day per steer	"	21·22	18·83
Profit per steer	$	13 16	15 80

Average of Three Year Steer Feeding Experiments.

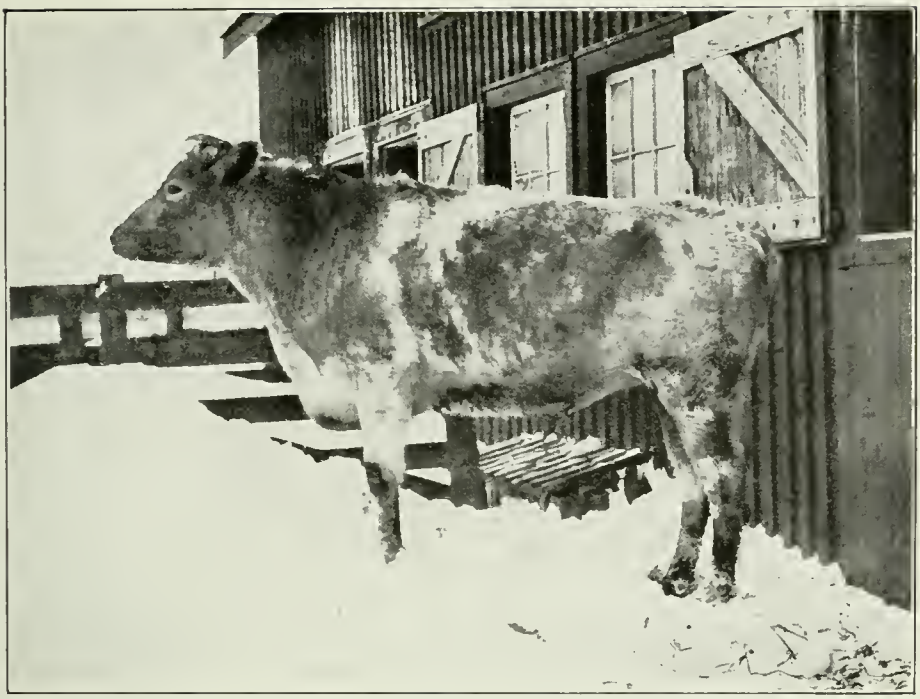
Comparisons of Lots 3 and 1; Good Butchers; Heavy-fed vs. Light-fed.

		Lot 3 "Heavy Fed"	Lot 1 "Light Fed"
Total live weight of steers at start	lb.	6,291	6,093
Total live weight of steers at finish	"	7,668	7,402
Increase	"	1,377	1,309
Lot 3—			
Original weight of 5·3 steers, 6,291 pounds at 6·58 cents	$	415 68	.....
Weight at finish of 5·3 steers, 7,668 pounds at 8·45 cents	"	651 87	.....
Lot 1—			
Original weight of 5·3 steers, 6,093 pounds at 6·58 cents	$	.....	404 16
Weight at finish of 5·3 steers, 7,402 pounds at 8·45 cents	$	.....	630 43
Gross profit	$	236 19	226 27
Amount of hay consumed	lb.	9,210	9,210
Amount of meal consumed	"	4,230	2,820
Amount of roots consumed	"	33,714·8	22,476·5
Amount of molasses consumed	gal.	41·53	41·53
Cost of feed for lot for 112·6 days	$	138 78	107 57
Net profit	$	97 41	118 70
Daily rate of gain per steer	lb.	2·252	2·094
Cost of 1 pound gain	cts.	10 33	8·646
Cost of feed per day per steer	"	23·25	19·55
Profit per steer	$	18 38	22 39

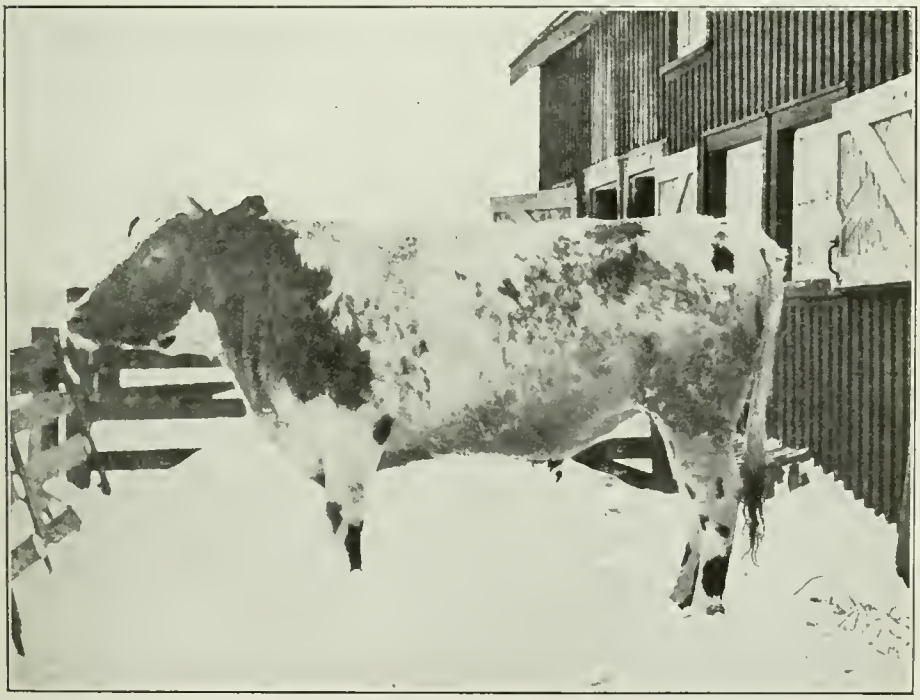
Comparison of Lots 2 and 4; Good Stockers; Heavy-fed vs. Light-fed.

——		Lot 2 "Heavy Fed"	Lot 4 "Light Fed"
Total live weight of steers at start	lb.	5,893	5,179
Total live weight of steers at finish	"	7,217	6,270
Increase	"	1,324	1,091
Lot 2—			
Original weight of 5·3 steers, 5,893 pounds at 6·58 cents	$	390 03	.....
Weight at finish of 5·3 steers, 7,217 pounds at 8·45 cents	$	613 95	.....
Lot 4—			
Original weight of 5 steers, 5,179 pounds at 6·58 cents	$	.....	342 58
Weight at finish of 5 steers, 6,270 pounds at 8·45 cents	$	.....	532 85
Gross profit	$	223 92	190 27
Amount of hay consumed	lb.	9,210	8,545
Amount of meal consumed	"	4,230	2,624
Amount of roots consumed	"	33,714·8	20,773·2
Amount of molasses consumed	gal.	41·53	41·53
Cost of feed for lot for 112·6 days	$	138 78	100 66
Net profit	$	85 14	89 61
Daily rate of gain per steer	lb.	2·114	1·90
Cost of 1 pound gain	cts.	11·08	9·57
Cost of feed per day per steer	"	23·25	17·88
Profit per steer	$	16 06	17 92

The prices of the meal ration was $1.50 per hundredweight; roots, $2 per ton; hay, $8 per ton; molasses, 20 cents per gallon. See table as to amounts for respective periods of four weeks each.



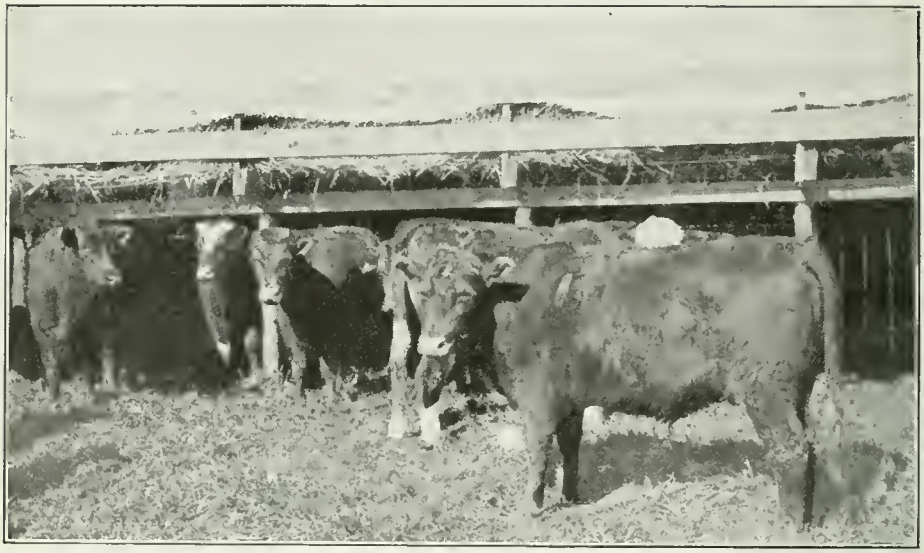
A dairy type steer fed at Charlottetown Experimental Station, 1915.



A beef type steer fed at Charlottetown Experimental Station, 1915.

Type of steers fed, Experimental Farm, Nappan, N.S.

Brandon: A few of the steers fattened.



Some of the steers in Lot I, showing straw shelter shed. Experimental Station, Lethbridge, Alta.

Cattle in the feeding yards at Lacombe Station. Note the feeding racks for hay.

Root and Meal Rations for Steers.

Lot.	Row.	No. of steers.	Ration per steer per day. Jan. 1 to Jan 29.			Ration per steer per day. Jan. 29 to Feb. 26.			Ration per steer per day. Feb. 26 to Mar. 25.			Ration per steer per day. Mar. 25 to Apr. 3	
			Roots.	Meal.	Molasses. 2 steers.	Roots.	Meal.	Molasses 2 steers.	Roots.	Meal.	Molasses 2 steers.	Meal.	Molasses 2 steers.
			Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
1	1	4	40	4	1	33·3	6	2	30	8	2	11	3 1
2	2	4	60	6	1	50	9	2	45	12	2	16·5	3 1
3	2	4	60n	6	1	50	9	2	45	12	2	16·5	3 1
4	1	4	40	4	1	33·3	6	2	30	8	2	11	3 1

OBJECT OF EXPERIMENT.

1. To show the results of feeding 50 per cent more roots and meal to heavyweight steers.
2. To show the results of feeding 50 per cent more roots and meal to lightweight steers.
3. To show the profit in feeding the medium and heavyweight steers.
4. To show the value of molasses in finishing beef.

METHOD OF WORK.

The steers were weighed three consecutive mornings, starting January 1, 1916, and weighed at one week intervals (Monday mornings) until the end of the period, at a reasonable hour after the morning's meal and before they were watered. Individual weights were kept and all were dehorned on December 14, 1915.

FEEDING.

1. Feeding period was from January 1, 1916, to April 3, 1916.
2. From December 14, 1915, to January 1, 1916, was their preparatory feeding period, in which they were given hay, roots and meal, gradually working them up to the normal ration.
3. See table for feeding period.
4. They received two feeds of good clover-hay per day.
5. Roots consisted largely of turnips.
6. The meal consisted of the following mixture: 200 pounds oats and barley (equal parts by weight), 200 pounds bran, 50 pounds oilcake and 50 pounds cottonseed.

DATA FROM EXPERIMENT.

Aside from a few variations, due primarily to the individuality of the animals in the feeding test, the results obtained this season compare very favourably with those of the two previous years. In table I it will be noted that while the good butchers, or heavy-fed steers, put on more flesh than did the light-fed good butchers, the increase was not sufficient to compensate for the extra feed; hence, the latter gave the greater profit.

In table 2—good stockers, heavy-fed, versus good stockers, light-fed—the same results are found, though the difference is slightly greater. The reason is doubtless due to the fact that steers Nos. 1, 2 and 4 in lot 2 were not good doers. No. 1 was a very nervous steer. Had they all been as good feeders as No. 3 the profit from the heavy-fed stockers would have been greater than from the light-fed. For instance, steer No. 3 made an average daily gain of 2·7 pounds while the other three averaged only 1·8 pounds for the same period.

In every case where molasses was fed in addition to the regular ration, a greater increase in weight was obtained, but in only two instances was the increase sufficient to compensate the extra cost of molasses. Hence from the experience gained in the last three years in feeding molasses, it can be safely stated that could it be bought for $20 to $23 per ton it would be a profitable feed in the finishing of beef steers. The effect it has on the condition of the animal is most marked. Following the results of this year is a table giving the average of three years, from which it can be taken that there is (taking one year with another) a good profit to be derived from judicious feeding of well-bred steers. It would also appear that up to 40 to 50 pounds of roots, together with an average of 6·5 pounds of meal per steer per day (that is to say, one would start feeding about 2-3 pounds and finish with about 10-12 pounds, decreasing the roots as the meal is increased) the greatest profit would be realized.

NAPPAN.

EXPERIMENTAL STATION, KENTVILLE, N.S.

REPORT OF THE SUPERINTENDENT, W. S. BLAIR.

STEER-FEEDING EXPERIMENTS.

Twenty-nine grade steers were purchased in the fall and put on a feeding test running from November 15 to March 15. These steers were not all that could be desired, but were as good a lot as could be obtained, and represent an average of steers available in this county. They were for the most part grade Shorthorn.

Twenty-four of the steers were dehorned and divided into two lots of twelve each, the selection being made to have the lots uniform. These were allowed to run in two pens, each 25 by 14 feet in size, for each lot of steers. One of these lots was fed pulped turnips and the other ensilage as the succulent feed, all other feeds being alike.

Lot 1 was fed 60 pounds roots each per day for the first six weeks, 50 pounds for the next two, 40 pounds for the next two, and 35 pounds for the remaining six weeks of the period. Lot 2 was fed 40 pounds of ensilage each, per day, for the first six weeks, 35 pounds for the next two, 30 pounds for the next two, and 25 pounds for the remaining six weeks of the period. The meal ration was the same for each lot and was fed at the rate of 1 pound each per day for the first week, 2 pounds for the second week, 4 pounds for the next two weeks, 6 pounds for the next two weeks, 7 pounds for the next two weeks, 8 pounds for the next four weeks, and 9 pounds for the remaining four weeks. This averaged 6·17 pounds meal per steer per day for the feeding period. Ten pounds of mixed hay of only fair quality was given each steer per day during the whole period.

The roots were valued at $2 per ton. The ensilage was valued at $3 per ton. The meal mixture cost $31.20 per ton or 1·56 cents per pound, and was made up of the following:—

200	pounds wheat bran at $1.20 per hundred	$2 40
200	" cottonseed meal at $1.80 per hundred	3 60
100	" ground oats at $1.55 per hundred	1 55
100	" cornmeal at $1.80	1 80
600		$9 35

The hay cost $12 per ton.

The succulent feed was given first, about 7 a.m., and on this the meal was scattered. After this was eaten, hay was given. This was repeated at 4.30 p.m. An equal amount of each feed was given morning and afternoon.

The steers were given a fresh bedding of straw each day and were cleaned out once every two weeks. It takes ten pounds of straw per steer per day to keep them properly bedded when running loose. They were allowed to run in the yard during fine mild days. Water was before them in a trough during the whole time. They were clipped on the thighs, legs and belly when put in and were washed with Kreso for lice.

The steers were weighed every thirty days. The results obtained would seem to show that there is little if any difference in the cost of feeding either turnips or ensilage. We can produce on our soils 18 tons of roots as easily as 12 tons of corn, and placing the cost per acre at $36 we calculate that the turnips are worth $2 per ton and corn $3. It will be noticed that it took 60 pounds of turnips to satisfy the steers

at the start of the feeding period, as compared with 45 pounds of ensilage. The steers receiving the 60 pounds of roots ate their hay more quickly and would have taken more, whereas the ensilage fed lot would not clean up more than the amount given.

The following table gives in detail the results of this experiment:—

		Lot 1 fed on Turnips.	Lot 2 fed on Ensilage.
Number of steers in lot	lb.	12	12
First weight, gross, November 15, 1915	"	10,110	10,115
First weight, average	"	842·5	842·9
Finished weight, gross, March 15, 1916	"	12,765	12,815
Finished weight, average	"	1,063·75	1,067·9
Number of days in test	dys	120	120
Total gain in 210 days	lb.	2,655	2,700
Average gain per steer	"	221·25	225
Daily gain per steer	"	1·84	1·87
Daily gain per lot	"	22·12	22·5
Gross cost of feed for period	$	300 43	303 04
Cost of 1 pound gain per lot	cts.	11·31	11·22
Cost, original, November 15, 1915, at $5.50 per cwt	$	556 05	556 32
Total cost, March 15, 1916	"	856 48	859 36
Selling price, March 15, 1916, at $7.50 per cwt	"	957 37	961 12
Profit per lot	"	100 89	101·76
Profit per steer	"	8 40	8 48
Average valuation per steer at start, November 15, 1915	"	46 33	46 36
Average sale price per steer at finish, March 15, 1916	"	79 78	80 09
Average increase in value	"	33 45	33 73
Average cost of feed per steer	"	25 03	25 25
Amount of meal eaten	lb.	777	777
Amount of hay eaten	"	1,200	1,200
Amount of roots eaten	"	5,715	3,955

MANURE MADE BY TWENTY-FOUR STEERS.

A record has been kept of the quantity of manure made from the twenty-four steers running loose in two box stalls. They produced 1,872 pounds per day or 78 pounds per steer. For the period of 120 days they made 112 tons 640 pounds manure. The steers averaged 10 pounds of straw per day for bedding, making a total of 240 pounds per day for the twenty-four steers, and during the 120 days, 14 tons 800 pounds was used. The straw cost $9.50 per ton, making the cost for bedding $136.80.

Such manure, we are told by chemists, contains approximately 7¾ pounds of nitrogen, 3½ pounds of phosphoric acid, and 9 pounds of potash per ton. According to the present price of nitrate of soda, nitrogen is worth 24 cents per pound; at the present price of acid phosphate, phosphorus is worth 8 cents per pound, and potash cannot be obtained at any reasonable price, but assuming that muriate of potash could be got at the old price of $50 per ton, potash would be worth 5 cents per pound. At these prices, a ton of fresh-made stable manure would be worth as follows:—

7¾	pounds nitrogen at 24 cents per pound	$1 86
3½	" phosphorus at 8 cents per pound	28
9	" potash at 5 cents per pound	45
	Total value per ton	$2 59

Taking 112 tons 640 pounds of manure made by the twenty-four steers during the feeding period of 120 days at $2.59 per ton, this would be worth $290.90. If the value of the straw is deducted from this there is a balance of $154.10 to the credit of the steers to go against the labour. The time required to care for and feed the twenty-four steers did not amount to quite four hours per day, which is 17½ cents per hour was 70

KENTVILLE.

cents per day, and for the 120 days $84, which leaves a balance of $70.10, which amount should be added to the profit of the twenty-four steers. In this calculation the humus value is not taken into account. It is estimated that manure has a humus value of from 60 per cent to 100 per cent of the value of the chemical ingredients, depending on the soil on which it is used and the manner of application.

THE TEN BEST *VERSUS* THE TEN POOREST FEEDERS.

A selection was made of te of the best steers, five from lot 1 and five from lot 2, also of ten of the poorest, five from each lot. It will be noticed that these were of about equal weight when put in for feeding. The thick, blocky steer invariably has produced the best gain and this is quite noticeable in the best ten steers, which would be called fair grade Shorthorus with fair beef qualities.

The steers spoken of as the best are those conforming to a good beef type, whereas the poorest are those more of the dairy type formation with indications of poor beef qualities.

TEN Best *vs.* Ten Poorest Feeders.

		Ten Best Steers.	Ten Poorest Steers.
Number of steers in lot	lb.	10	10
First weight, gross, November 15, 1915	"	8,530	8,465
First weight, average	"	853	846·5
Finished weight, gross, March 15, 1916	"	11,135	10,325
Finished weight, average	"	1,113·5	1,032·5
Number of days in test	dys	120	120
Total gain in 120 days	lb.	2,605	1,860
Average gain per steer	"	260·5	186
Daily gain per steer	"	2·17	1·55
Daily gain per lot	"	21·70	15·5
Gross cost of feed for period	$	251 44	251 44
Cost of 1 pound gain per lot	cts.	9·65	13·51
Cost, original, November 15, 1915, at $5.50 per cwt	$	469 15	465 57
Total cost, March 15, 1916	"	720 59	717 01
Selling price, March 15, 1916, at $7.50 per cwt	"	835 12	774 37
Profit per lot	"	114 53	57 36
Profit per steer	"	11 45	5 73
Average valuation per steer to start, November 15, 1915	"	46 91	46 55
Average sale price per steer at finish, March 15, 1916	"	83 51	77 43
Average increase in value	"	36 60	30 88
Average cost of feed per steer	"	25 14	25 14
Amount of meal eaten	lb.	777	777
Amount of hay eaten	"	1,200	1,200
Amount of ensilage eaten	"	1,977·5	1,977·5
Amount of roots eaten	"	2,857·5	2,857·5

TIED IN STANCHIONS.

Five head were fed in the dairy barn in stanchions and these were not dehorned. They were fed on a mixture of turnips and ensilage mixed together in equal parts and given at the rate of 45 pounds for the first six weeks, 40 pounds for the next two weeks, 35 pounds for the next two weeks and 30 pounds for the remaining six weeks of the period. The meal and hay ration was similar to that given the other steers and was fed in the same way.

It will be noticed that these steers averaged heavier than the ones in lot 1 and lot 2 and should have made better gain; for this reason it is not fair to compare

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this lot with lot 1 and 2, and also they were tied whereas the others were loose. The tied lot were groomed every day but although allowed out occasionally they got very little exercise.

LOT 3.—TURNIPS AND ENSILAGE MIXED.

Number of steers in lot		5
First weight, gross November 15, 1915	lb.	4,630
First weight average	"	926
Finished weight, gross March 15, 1916	"	5,740
Finished weight average	"	1,148
Number of days in test	days.	120
Total gain in 120 days	lb.	1,110
Average gain per steer	"	222
Daily gain per steer	"	1·85
Daily gain per lot	"	9·25
Gross cost of feed for period	$	125·08
Cost of 1 pound gain per lot	cts.	11·26
Cost original, November 15, 1915, at $5.50 per cwt	$	254 65
Total cost, March 15, 1916	"	379 73
Selling price, March 15, 1916, at $7.50 per cwt	"	430 50
Profit per lot	"	50 77
Profit per steer	"	10 15
Average valuation per steer to start November 15, 1915	"	50 93
Average sale price per steer at finish March 15, 1916	"	86 10
Average increase in value	"	35 17
Average cost of feed per steer	"	25 01
Amount of meal eaten	lb.	777
" hay eaten	"	1,200
" roots eaten	"	2,279
" ensilage eaten	"	2,279

COST TO RAISE A SHORTHORN STEER.

The one grade Shorthorn cow kept at this Station has furnished us with bull calves, and a record has been kept of the cost of growing her first calf to the age of 20 months and 20 days. Feeding has been done as we thought most suitable for producing an economical beef steer. The feed consumed and gain for each six months is given in detail in the following table:—

GRADE SHORTHORN STEER.

From birth to 6 months old, 183 days.

Grain, 207 pounds at $1.60 per cwt	$	3 31
Roots, 460 pounds at 10 cents per cwt		0 46
Hay, 315 pounds at 60 cents per cwt		1 89
Whole milk, 227 pounds at 1·6 cents per pound		3 63
Skim-milk, 1,326 pounds at 20 cents per cwt		2 65
Total cost		$11 94
Average cost per day		6·52 cents
Weight at 6 months	308	lb.
Weight at birth	65	"
Gain in 6 months	243	"
Average daily gain		1·32 "
Cost to produce one pound		4·91 cents.

From 6 months to 1 year, 182 days.

Grain, 415 pounds at $1.60 per cwt	$	6.64
Roots, 1,426 pounds at 10 cents per cwt		1·426
Ensilage, 399 pounds at 15 cents per cwt		·598
Hay, 574 pounds at 60 cents per cwt		3·444
Molasses, 14 pints at 19 cents per gallon		·33
Pasture, 50 days at $1 per month		1.66
Total cost		$14·068

KENTVILLE.

Average cost per day.. .. ..cts.	7·74
Weight at one year.. .. ..lb.	570
Gain in 182 days.. .. .. "	262
Average daily gain.. .. .. "	1·439
Cost to produce 1 pound.. .. ..cts.	5·38
Total cost for 1 year.. .. .. $	$26.03
Average cost per day.. .. ..cts.	7·26
Total gain in weight.. .. ..lb.	505
Average daily gain... .. .. "	1·38
Cost to produce 1 pound... .. ..cts.	5·15

From 1 year to 18 months, 183 days.

Grain, 354 pounds at $1.60 per cwt..	$ 5 56
Roots, 990 pounds at 10 cents per cwt..	0 99
Ensilage, 780 pounds at 15 cents per cwt..	1 17
Hay, 590 pounds at 60 cents per cwt..	3 54
Pasture, 111 days at $1 per month..	3 70
Total cost..	$15 06

Average cost per day.. .. ..cts.	8·229
Weight at 18 months.. .. ..lb.	867
Gain in 183 days.. .. .. "	297
Average daily gain.. .. .. "	1·622
Cost to produce 1 pound.. .. ..cts.	5·07

From 18 months until March 31, 1916, 80 days.

Grain, 486 pounds at $1.60 per cwt..	$ 7 77
Roots, 1,215 pounds at 10 cents per cwt..	1 21
Ensilage, 1,215 pounds at 15 cents per cwt..	1 82
Hay, 810 pounds at 60 cents per cwt..	4 86
Total cost..	$15 66

Average cost per day.. .. ..cts.	19·57
Weight March 31, 1916.. .. ..lb.	985
Gain in 80 days.. .. .. "	118
Average daily gain... .. .. "	1·475
Cost to produce 1 pound.. .. ..cts.	13·27
Cost of steer at 20 months and 20 days.. .. .. $	56·758
Weight of steer at 20 months and 20 days.. .. ..lb.	985
Total gain.. .. .. "	920
Average daily gain.. .. .. "	1·464
Cost to produce 1 pound.. .. ..cts.	6·169
Sold at 7½ cents per pound, $73.87; profit.. .. .. $	17.11

It is interesting to note that for the period of 162 days in the pasture, allowing $1 per month, the cost was $5.30. The gain in weight was 272 pounds, or an average daily gain of 1·67 pounds, and the cost to produce 1 pound, 1·948 cents.

EXPERIMENTAL STATION, FREDERICTON, N.B.

REPORT OF THE SUPERINTENDENT, W. W. HUBBARD.

STEER FEEDING.

Twenty-four steers from two and a half to three and a half years old were purchased in November. Thirteen of them were of more or less Shorthorn breeding, costing $6.23 per 100 pounds, and eleven were of dairy type of no particular breeding, costing $4.57 per 100 pounds. They received hay, turnip tops and white turnips for the few days they were at the Station during November, and on the 1st December were put on a ration of 50 pounds turnips, 3 pounds of grain mash and hay. For a short time they received some turnip tops in addition to the roots.

The object of the feeding was primarily to turn the rough crops of the farm into fertilizer and also to test the result of feeding the two classes of steers. Herewith are given the tabulated results:—

DETAILS OF EXPERIMENT.

	Shorthorn Grades.	Dairy.	Total.
Number of animals in each group	13	11	24
First weight, gross, November 30 lb.	10,950	9,390	20,340
" average, November 30 "	842·3	853·6	847·5
Finished weight, gross, April 17 "	13,252·5	11,105·5	24,358
" average, April 17 "	1,019·4	1,009·6	1,014·9
Number of days in experiment days.	140	140	140
Total gain per period lb.	2,302·5	1,715·5	4,018
Average gain per animal "	177·3	156	167·4
Average daily gain for group "	16·44	12·25	28·7
" " " per animal "	1·26	1·11	1·19
Quantity meal eaten by group for period "	9,971	8,437	18,408
Quantity roughage for period "	112,840	95,480	208,320
Cost of feed per head for period $	23·64½	23·64½	23·64½
" " per day cents.	16·8	16·8	16·8
Cost to produce 1 pound gain "	13·3	15·1	14·1
Original cost of animals per group $	682.95	429.60	1,112.55
" plus cost of feed "	307.36	260.07	567.43
Selling price at $8 per 100 pounds "	1,060.20	.....	
" $6.34 per 100 pounds "	.....	704.45	1,764.65
Net profit per group "	69.89	14.78	84.67
" " animal (average) "	5.39	1.34	3.53
Nutritive ratio of total ration, 1:7.33.			
Nutritive ratio of meal ration, 1:2.27.			
Dry matter required to produce 1 pound gain lb.	16·48	18·71	17·44
Digestible matter required to produce 1 pound gain. "	10·77	12·23	11·4
Meal required to produce 1 pound gain "	4·33	4·91	4·58
Roughage required to produce 1 pound gain "	49·00	55·64	51·85

FINANCIAL STATEMENT.

Expenditures.

11 dairy steers, 9,390 pounds at $4.57 per 100 lbs	$ 429 60
13 Shorthorn Grades, 10,950 pounds at $6.23 per 100 pounds	682 95
Hay, 20 tons, 320 pounds at $7 per ton	141 12
Turnips, 3,360 bushels at 5 cents per bushel	168 00
Bran, 5 tons 519 pounds at $22.50 per ton	118 34
Cottonseed meal, 2 tons, 1,259 pounds at $34.50 per ton	90 72
Oilcake, 1 ton 629 pounds at $37.45 per ton	49 25
	$1,679 98

Returns.

By sale 11 dairy steers, 11,105·5 pounds at $6.34 per 100 pounds ..	$ 704 45
By sale 13 Shorthorn grades, 13,252·5 pounds at $8 per 100 pounds..	1,060 20
	$1,764 65

Balance.

Total returns..	$1,764 65
Total expenditure..	1,679 98
Profit..	$ 84 67

EXPERIMENTAL STATION, LENNOXVILLE, QUE.

REPORT OF THE SUPERINTENDENT, J. A. McCLARY.

BEEF CATTLE.

During the summer and fall of 1915 ninety-two head of stockers were purchased to consume the roughages such as silage corn and hay produced on the farm. The following experiments were conducted with these steers:—

Loose *versus* tied.
Light grain ration *versus* heavy grain ration.
Possible profits of steer feeding.

Owing to these cattle not having been delivered at the present time, the results of these experiments are not yet available.

EXPERIMENTAL FARM, BRANDON, MAN.

REPORT OF THE SUPERINTENDENT, W. C. McKILLICAN, B.S.A.

BEEF CATTLE.

All the breeding cattle on this Farm are handled as a dairy herd, and are reported upon in the Dairy section of the report. The only beef cattle fed and handled as such are the feeding steers purchased each fall for experimental feeding during the winter.

STEER FEEDING EXPERIMENTS.

The steer-feeding experiments conducted during the winter of 1914-15, included a comparison of shelter in a warm stable as against an open shed and corral, and a comparison of mixed grass hay and green oat hay as ordinarily grown in Manitoba with straw and corn silage, and also with alfalfa hay. Two carloads of steers were used for these experiments. They were purchased in Winnipeg stock yards on October 21, 1914, at 6 cents per pound. Freight, shrinkage, and feed until November 13 brought their cost up to $6.46½ per hundredweight when the experiments were started on the latter date. They were divided into four lots as evenly in regard to size and appearance of feeding quality as possible. Two lots were fed in large box stalls in a warm stable. Two lots were fed in a corral surrounded by a tight board fence and with an open shed at one side for shelter from storms. Of the two inside lots, one received oat straw and corn silage as their roughage, and the other green oat hay part of the time and later mixed grass hay. Of the two outdoor lots, one received the same hay ration as the indoor lot and the other received alfalfa hay. All four lots received the same grain ration, which consisted of two parts of chopped oats and one part of chopped barley or part of the time corn instead of barley. The grain ration started at 2 pounds per steer per day and was gradually increased to 8 pounds, at which rate it remained for about 2 months. It was then gradually increased to 14 pounds, at which rate they were being fed at the close of the experiments. The steers were shipped and the experiments finished on May 24, 1915. The selling price was $8.75 per hundredweight farm weights, with 5 per cent off for shrinkage. The gains made by each steer are shown in the following tables, and the summary shows results in profits, cost of production, etc.

Lot 1.—In Stable. Fed Mixed Hay.

Steer.	Weight Nov. 13.	Weight Dec. 22.	Weight Jan. 19.	Weight Feb. 16.	Weight Mar. 16.	Weight April 13.	Weight May 24	Gain.
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
No. 1	835	925	935	990	1,030	1,105	1,175	340
No. 2	976	1,070	1,080	1,103	1,190	1,265	1,320	344
No. 3	990	1,065	1,110	1,112	1,175	1,235	1,270	280
No. 4	932	1,055	1,125	1,160	1,195	1,293	1,370	434
No. 5	980	1,080	1,120	1,170	1,260	1,300	1,380	400
No. 6	902	1,035	1,055	1,125	1,170	1,232	1,285	383
No. 7	755	860	870	940	980	1,065	1,150	395
No. 8	822	875	920	970	1,000	1,062	1,133	311
No. 9	935	1,080	1,110	1,170	1,200	1,270	1,365	430
No. 10	841	885	950	950	950	1,020	1,140	299
Average	896·8	993	1,027·5	1,069	1,115	1,184·7	1,258·8	362

Lot 2.—In Stable. Fed Silage and Straw.

Steer.	Weight Nov. 13.	Weight Dec. 22.	Weight Jan. 19.	Weight Feb. 16.	Weight Mar. 16.	Weight April 13.	Weight May 24.	Gain.
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
No. 1	947	1,045	1,045	1,090	1,130	1,205	1,255	308
No. 2	815	890	890	940	980	1,035	1,140	325
No. 3	825	915	895	975	980	1,045	1,110	285
No. 4	921	1,015	1,040	1,090	1,115	1,200	1,275	354
No. 5	937	1,025	1,035	1,080	1,120	1,200	1,260	323
No. 6	1,060	1,155	1,160	1,210	1,240	1,313	1,410	350
No. 7	800	860	880	925	980	1,045	1,115	315
No. 8	795	845	850	910	920	1,000	1,065	270
No. 9	980	1,080	1,105	1,160	1,185	1,270	1,350	370
No. 10	925	1,000	1,005	1,020	1,090	1,155	1,220	295
Average	900·5	9,830	9,905	1,040	1,074	1,146·8	1,220	319·5

Lot 3.—In Corral. Fed Mixed Hay.

Steer.	Weight Nov. 13.	Weight Dec. 22.	Weight Jan. 19.	Weight Feb. 16.	Weight Mar. 16.	Weight April 13.	Weight May 24.	Gain.
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
No. 1	915	965	995	1,015	1,025	1,070	1,195	280
No. 2	995	1,075	1,110	1,160	1,180	1,266	1,415	420
No. 3	942	1,050	1,060	1,090	1,120	1,180	1,280	338
No. 4	940	1,015	1,075	1,130	1,140	1,210	1,325	385
No. 5	970	1,045	1,060	1,085	1,085	1,170	1,265	295
No. 6	782	845	865	880	910	985	1,070	288
No. 7	800	860	880	905	860	915	1,020	220
No. 8	915	970	1,025	1,060	1,085	1,135	1,250	335
No. 9	910	910	970	1,000	985	1,035	1,180	270
No. 10	805	890	925	950	970	1,012	1,115	310
Average	897·4	962·5	996·5	1,027·5	1,036	1,097·8	1,211·5	314·1

Lot 4.—In Corral. Fed Alfalfa.

Steer.	Weight Nov. 13.	Weight Dec. 22.	Weight Jan. 19.	Weight Feb. 16.	Weight Mar. 16.	Weight April 13.	Weight May 24.	Gain.
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
No. 1	787	845	870	915	925	945	1,090	303
No. 2	930	980	1,030	1,080	1,110	1,130	1,270	340
No. 3	825	845	870	910	940	972	1,083	258
No. 4	942	1,035	1,060	1,105	1,110	1,167	1,325	383
No. 5	909	950	1,030	1,080	1,090	1,115	1,240	331
No. 6	985	1,045	1,045	1,105	1,125	1,160	1,275	290
No. 7	986	1,005	990	1,075	1,090	1,142	1,295	309
No. 8	910	950	1,000	1,060	1,020	1,095	1,232	322
No. 9	850	930	945	995	960	1,037	1,205	355
No. 10	836	915	930	980	1,005	1,105	1,215	379
No. 11	837	860	860	925	940	980	1,185	348
Average	890·6	941·8	966·4	1,020·9	1,028·6	1,077·1	1,219·5	328·9

Summary of Steer Feeding Experiments, 1914-15.

		Fed in Stable.		Fed in Corrals.	
		Lot 1. Green oat hay Cut mixed hay	Lot 2. Oat straw. and ensilage.	Lot 3. Green oat hay Cut mixed hay	Lot 4 Cut alfalfa.
Number of steers in lot		10	10	10	11
First weight, gross, November 13, 1914	lb.	8,968	9,005	8,974	9,797
First weight, average	"	896·8	900·5	897·4	890·6
Finished weight, gross, May 24, 1915	"	12,588	12,200	12,115	13,415
Finished weight, average	"	1,258·8	1,220	1,211·5	1,219·5
Total gain in 191 days	"	3,620	3,195	3,141	3,618
Average gain per steer	"	362	319·5	314·1	328·9
Average daily gain per steer	"	1·90	1·67	1·64	1·72
First cost of steers at $6.46½ per cwt	$	579 78	582 17	580 17	633 38
Total cost of feed	$	390 42	353 07	390 42	437 04
Total cost	$	970 20	935 24	970 59	1,070 42
Receipts from sale at $8.75 per cwt. 5 per cent off for shrinkage	$	1,046 41	1,014 12	1,007 05	1,115 10
Profit	$	76 21	78 88	36 45	44 68
Average cost per steer	$	57 98	58 22	58 02	57 58
Average cost of feed per steer	$	39 04	35 31	39 04	39 73
Average selling price per steer	$	104 64	101 41	100 70	101 37
Average profit per steer	$	7 62	7 88	3 64	4 06
Average cost of 100 pounds gain	$	10 73	11 05	12 43	12 08
Returns realized from 100 pounds of oats and barley	$	2 44	2 48	2 07	2 13
Amounts of feed used.					
Oat chop, oats at 60 cents per bushel	lb.	10,054	10,054	10,054	10,467
Barley chop, barley at 70 cents per bushel	"	796	796	796	873
Corn chop, corn at 86 cents per bushel	"	4,310	4,310	4,310	4,742
Straw at $2 per ton	"	11,900	11,900	.....	.....
Ensilage at $3 per ton	"	.....	57,300	.....	.....
Cut green oat hay at $10 per ton	"	11,220	.....	11,220	.....
Cut mixed hay at $10 per ton	"	15,820	.....	15,820	.....
Cut alfalfa at $12 per ton	"	.....	.....	.....	27,797

Stable vs. Corral.—In comparing lots 1 and 3, getting the same feed but with different shelter, it will be observed that the stable-fed steers made a better gain by 0·26 pound per day and greater profit by $3.98 than those fed in the corral. But previous results indicate that the outdoor steers usually do more nearly as well as the stabled ones. While this year's results certainly favour the stabling of steers, the advantage when the cost of buildings is considered is not very conclusive. Considering the fact that the grain used was charged at the extremely high prices current in the fall of 1914, the results indicate that either type of shelter may be used successfully. Had the grain been charged at ordinary prices, the profits would have been increased about $15 per steer. It will also be observed that a large part of the gains made by the steers in the corral was made after the weather got warm toward spring. This shows the advantage of not marketing until the latter part of May.

Ensilage and Straw vs. Hay.—The steers that got hay made an average gain of 0·23 pound per day more than those that got ensilage and straw. However, the lower cost of the straw and ensilage made the profit from that kind of feed slightly greater than that from the hay. As straw is practically a waste product on most farms and corn can be grown in large quantities more cheaply than hay, this method of feeding should offer good opportunities for successful feeding where hay is searce.

Oat and Grass Hay vs. Alfalfa.—The alfalfa again showed its superiority over the other hay crops. Although 1 pound per steer per day less alfalfa was fed, yet the

steers gained 0·08 pound per steer per day more on it. The profit per steer was 42 cents more from the alfalfa although it was charged at $2 per ton more than the other hay.

EXPERIMENT FOR 1915-16.

A carload of steers for experimental work during the present winter was purchased in November, 1915. They are a very uniform lot of steers and somewhat better in type than those used last year. They cost 6 cents per pound in the Winnipeg stockyards. The experiment being conducted this year is a comparison of unthreshed sheaf oats with cut straw and chopped oats, to see if the work of threshing, cutting straw, and chopping grain is justified by increased gains, and also to see what profits can be shown by the method of feeding unthreshed grain.

EXPERIMENTAL FARM, INDIAN HEAD, SASK.

REPORT OF THE ASSISTANT TO THE SUPERINTENDENT, K. MacBEAN, B.S.A.

BEEF CATTLE.

The only beef cattle on this Farm are the feeding steers purchased each fall for experimental work.

During the fall of 1915, sixty steers were purchased locally for experimental feeding. These were dehorned and divided into five groups of twelve each with the view of gaining information relative to the best methods of wintering feeding cattle. The different methods under test are: bush vs. open corral vs. open shed vs. stable.

The steers wintered out were fed the same daily grain ration and all the upland prairie hay they would eat up clean. Lots 4 and 5, which were tied in the stable, received, in addition, silage and roots.

Notwithstanding the extremely cold winter, the cattle outside made very satisfactory gains, as may be noted in the following table, which summarizes results:—

STEER FEEDING EXPERIMENTS.

	Lot 1.	Lot 2.	Lot 3.	Lot 4	Lot 5.
	Bush shelter.	Open corral.	Corral and open shed.	Stable with addition of silage to ration.	Stable with addition of roots to ration.
Number of steers in experiment	12	12	12	12	12
Number of days on experiment....dys.	135	135	135	135	135
Total weight at beginning of experiment....lb.	12,850	12,790	12,700	11,230	11,140
Average weight at beginning of experiment.... "	1,070⅝	1,065⅝	1,058⅓	935⅝	928⅓
Total weight at finish of experiment. "	15,490	15,410	15,490	13,765	13,930
Average weight at finish of experiment "	1,290⅝	1,284⅓	1,290⅝	1,147½	1,160⅝
Total gain during experiment..... "	2,640	2,620	2,790	2,535	2,790
Average gain per head..... "	220	218⅔	232½	211¼	232½
Daily gain per head..... "	1·63	1·6	1·72	1·56	1·72
Amount of meal eaten..... "	10,860	10,860	10,860	10,860	10,860
Amount of hay eaten..... "	45,816	45,816	45,816	19,952	19,952
Amount of silage eaten..... "	.....	.....	.....	41,640	.....
Amount of roots eaten..... "	.....	.....	.....	.....	43,340
Cost of meal at $25 per ton..... $	135 75	135 75	135 75	135 75	135 75
Cost of hay at $10 per ton..... $	229 08	229 08	229 08	99 76	99 76
Cost of silage at $3 per ton..... $	.....	.....	.....	62 46	.....
Cost of roots at $3 per ton..... $	.....	.....	.....	.....	65 01
Total cost of feed per period..... $	364 83	364 83	364 83	297 97	300 52
Cost to produce 1 pound gain..... c	13·81	13·92	13·07	11·75	10·77

EXPERIMENTAL STATION, ROSTHERN, SASK.

REPORT OF THE SUPERINTENDENT, W. A. MUNRO, B.A., B.S.A.

STEER-FEEDING EXPERIMENT.

Eighteen steers 2 to 3 years of age were purchased in November. These were fed in an open corral and made very satisfactory gains and profits during the winter months.

As these cattle have not yet been sold, the detailed results of this trial will be reserved till the next report.

Cuts of Beef from Holstein Heifer 3 years old. Live weight 1,420, dressed weight 802.

Elm Park Wizard. The famous Angus sire heading the Lacombe Station herd.

EXPERIMENTAL STATION, LETHBRIDGE, ALTA.

REPORT OF THE SUPERINTENDENT, W. H. FAIRFIELD, M.S.

STEER-FEEDING EXPERIMENT.

An experiment in winter steer feeding, along similar lines to those which have been conducted during the past few years, was again carried out in the winter of 1915-16. An attempt is being made with these experiments in the feeding of steers, as well as those with the lambs, to solve a market problem which is becoming more acute each season for the hay growers on irrigated lands. It is a generally conceded fact in this district that the most profitable crop a farmer can raise on irrigated land is alfalfa, provided he can dispose of it readily at a reasonable price. It is hardly necessary, nor perhaps fitting, to give here the various reasons why alfalfa is so particularly profitable for him to raise, nor why it is almost imperative that he should devote a certain part of his irrigated farm to the growing of it. Sufficient to say that he does recognize these facts, that the acreage of this crop in the district is increasing each season, and that he is only following in the steps of the farmers in practically all the successful irrigation projects that have been developed during the last few decades on the western part of this continent.

A price of $6 or better per ton for his hay in the stack allows him reasonable compensation for his labour and a fair profit on his venture. Owing to the limited amount of breeding stock kept on the irrigated farms, a condition that we trust will soon improve, a large proportion of the hay now raised is being offered to a market that is not large enough to absorb such a quantity. Even in seasons when the market is strong only baled hay of good colour and quality finds a ready sale. Often alfalfa is of good feeding value but sufficiently off in colour to prevent it being sold to good advantage when baled. Consequently the problem of disposing of the hay must be met by feeding at least a large proportion of the crop, on the farm. It was to attempt to assist in finding some profitable means of feeding alfalfa on the home farm that the feeding tests with steers and lambs were inaugurated and carried out on the Station.

The summer of 1915 was wet and it was very difficult to save alfalfa in good condition. The quality of the hay fed in the test this past winter was very ordinary owing to the above fact. None of it would grade No. 1 and most of it was distinctly low grade. There was just one good point in favour of all that was fed, and that was that it was not coarse and the leaves were fairly well retained.

PLAN OF EXPERIMENT.

There were two main objects in mind when planning the test. One was to determine the advisability of feeding alfalfa in combination with some other roughage and the other was to compare a long feeding period, which would have the advantage of consuming more hay, with a short feeding period.

In the fall of 1915 four carloads of steers were purchased at the Calgary stockyards through the commission firm of Wade & Jack.

All of the steers not muleys were dehorned at the yards in Calgary before shipping. There are so many advantages in having the stock dehorned when put in the feed lots that the slight setback resulting from the dehorning is made up many times. The cattle are much more quiet and tractable, require less space at the racks and troughs, and should there be any difference in sizes, the smaller ones have a better chance on account of being less timid. It is, of course, advisable to have the steers

as near the same size as possible if the best results in feeding are to be obtained. The steers were put in the feeding pens on November 12. They had been received at the Station about two weeks previous and were allowed the run of a pasture for this length of time to allow them to recover from the effects of their trip. They were divided into four lots consisting of a carload each. The first three lots were made up so as to be as nearly equal as possible in quality and size. The fourth lot consisted of the smaller ones of the consignment, and although about equal in quality to the first three they averaged about 100 pounds apiece less in weight and were put on a relatively longer feeding period. Lots 1, 2, and 3 were to be put on short feed and were to be fed as follows:—

Lot 1, alfalfa hay.

Lot 2, three-quarters alfalfa hay and one-quarter green oat sheaves.

Lot 3, three-quarters alfalfa hay and one-quarter dry corn fodder.

This was their roughage, and they were fed what they would eat up clean at all times. The grain, which consisted of equal parts of crushed oats and barley, was not fed heavily, the intention being only to give them an amount that would insure fair gains but no more, as the real object of the test was to dispose of as much roughage as could profitably be done. Each of these lots—1, 2, and 3—received the same quantity of grain. The daily grain ration of lot 4 was about half of what the first three lots received. Lots 1 and 2 were sold to P. Burns & Co. on March 17, and lot 3 to Delaney's Ltd., March 18. Lot 1 brought $7.65 per cwt., lot 2, $7.75 per cwt., and lot 3, $7.83 per cwt. Lot 4 is to be fed on and turned on pasture for a few weeks previous to offering for sale.

PRICES CHARGED FOR FEED.

Alfalfa hay, $12 per ton.

Green oat sheaves, $10 per ton.

Dry corn fodder, $5 per ton.

Crushed barley and oats, $20 per ton.

No charge is made for labour, as the price of the roughage is put high enough to cover this item. The following table gives details as to the amounts fed, gains, cost and profits or losses:—

STEER FEEDING EXPERIMENT.

		Group I.	Group II.	Group III.
Number of steers in group		21	21	21
First weight, gross, November 12	lb.	21,020	21,343	21,580
First weight, average	"	1,001	1,016	1,028
Finished weight, gross, March 17, March 17, and March 18	"	24,725	25,468	24,660
Finished weight, average	"	1,177	1,213	1,174
Total gain for period (126, 126, and 127 days)	"	3,705	4,125	3,080
Average gain per steer	"	176	196	147
Average daily gain per steer	"	1·4	1·6	1·2
Amount of meal eaten by group	"	17,890	17,890	17,701
Amount of alfalfa hay eaten by group	"	59,885	45,610	48,015
Amount of oat sheaves eaten by group	"	.....	16,425	.....
Amount of corn fodder eaten by group	"	.....	.....	17,295
Amount of salt eaten by group	"	117	118	122
Total cost of feed	$	539 38	535 86	509 56
Cost of feed per steer	$	25 68	25 52	24 26
Cost of feed per steer per day	$	20	20	19
Cost to produce 1 pound gain	$	15	13	17
Original cost of group, including freight, etc	$	1,306 63	1,326 72	1,341 43
Original cost of group plus cost of feed	$	1,846 01	1,862 58	1,850 99
Selling price at $7.65, $7.75, and $7.83 per hundred pounds and 3 per cent shrink	$	1,834 72	1,914 56	1,872 95
Net profit on group	$	(loss)11 29	51 98	21 96
Net profit per steer	$	(loss) 54	2 48	1 05

LETHBRIDGE.

It will be noted that lot 1 showed an apparent loss of 54 cents per steer. Alfalfa hay is put in at a value of $12 per ton so that this year's results will be comparable with the results published from previous feeding tests. As an actual fact, however, alfalfa was not worth any more than oat sheaves and as the current price of alfalfa was $6 per ton in the stack a price of $10 per ton would be a liberal amount to charge against the experiment and would leave a good margin to cover labour of feeding.

The following supplementary table has, therefore, been made out giving details of cost and profit when the alfalfa is charged at $10 per ton, which is less misleading than is the above table:—

DETAILS as to Cost and Profit when Alfalfa is charged at $10 per ton instead of $12 per ton.

		Group I.	Group II.	Group III.
Total cost of feed	$	479 50	490 26	504 79
Cost of feed per steer	$	22 83	23 35	24 04
Cost of feed per steer per day	$	0 18	0 19	0 19
Cost to produce 1 pound gain	$	0 13	0 12	0 14
Original cost of group, including freight, etc.	$	1,306 63	1,326 72	1,341 43
Original cost of group plus cost of feed	$	1,786 13	1,816 98	1,846 22
Selling price at $7.65, $7.75, and $7.83 per 100 pounds, and 3 per cent shrink	$	1,834 72	1,914 56	1,872 95
Net profit on group	$	48 59	97 58	26 73
Net profit per steer	$	2 31	4 65	1 27

On this basis of charges for feed the financial statement would be as follows:—

Cost of steers, including freight		$ 3,974 78
Cost of feed		1,474 55
Interest on investment (4½ months at 8 per cent)		119 25
Selling price	$5,622 23	
Net profit		53 65
	$5,622 23	$ 5,622 23

DEDUCTIONS FROM TEST.

When the alfalfa is charged at $10, the same as the oat sheaves, each group shows a profit. It should be noted, however, that an alfalfa grower is really accomplishing his aim should he feed and come out just even, for he is disposing of his hay at a good price. He also has a good supply of manure on hand, the value of which any good farmer appreciates.

The group receiving some oat sheaves with the alfalfa showed a greater gain than did the group on alfalfa alone. This conforms with our previous experiments along this line. It pays without doubt to feed some other roughage with alfalfa hay, for the stock will appreciate the variety in their rations and will consume more and so make greater gains. Prairie hay, if it is obtainable, would make a very good substitute for the green oat sheaves.

EXPERIMENTAL STATION, LACOMBE, ALBERTA.

REPORT OF THE SUPERINTENDENT, G. H. HUTTON, B.S.A.

BEEF CATTLE.

The herd of pure-bred Aberdeen Angus cattle now numbers thirty head. There have been during the past year some losses in this herd. We have lost two calves by abortion, and one from indigestion. We are fortunate, however, in that the abortion was not a contagious form, else our losses might have been much greater. There have been no losses during the year in this herd from blackleg, and, as vaccination at regular intervals of six months is being practised, we do not expect a repetition of the trouble experienced with this disease in 1914. A number of promising youngsters have been raised during the year and since the herd has been strengthened by the addition of the famous bull, Elm Park Wizard, the general quality of the young cattle should continue to improve. Sales of young bulls have been satisfactory during the year and we expect to dispose of the few remaining individuals at reasonable prices before the breeding season of 1916 is over.

GAINS OF YOUNG CATTLE ON PASTURE.

The following table indicates the gains secured on a number of yearling and 2-year-old heifers and steers on pasture during the past season.

The cost of a pound of gain, with pasture valued at $1 per head per month, is 1·99 cents for the average of this group. Some information has been secured with regard to the relative stock carrying power of cultivated vs. native grass. From the information available, it is estimated that the stock carrying power of land under cultivated grass is fully 100 per cent greater than that under native grass growing on the same class of soil.

Number of cattle		17
Gross weight weighed out May 22	lb.	12,140
Gross weight weighed in November 5	"	16,833
Total gain for period	"	4,693
Average daily gain per head	"	1·66
Total cost of pasture at $1 per month	$	93.50
Cost of 1 pound of gain	cents.	1 99

FEEDING FOR BEEF.

An interesting variation in the feeding trials at Lacombe was introduced in the spring of 1915 when an experiment was begun to determine the stock carrying power of a section of land under native grass and also to obtain data as to the gains likely to be made on grass by steers of different ages and in different conditions at the time they were turned on to pasture. One hundred and two 2- and 3-year-old cattle were turned out during the months of May and June on this land, which was well fenced and contained a good supply of water. The cattle were weighed out in four different groups and were so branded that it was possible to redivide them in the fall into these same groups and record the gains made during the season.

The following table indicates these gains:—

TABLE of Gains made on Pasture by Steers at Dominion Experimental Station, Lacombe, Alberta.

Lot.	Date on Pasture.	Weight.	Average Weight.	Date from Pasture.	Fall Weight.	Average Weight.	Average Gain.
		Lb.	Lb.		Lb.	Lb.	Lb.
54	May 14, 1915	43,154	799	Nov. 5, 1915	64,420	1,193	394
7	" 22, 1915	5,590	799	" 6, 1915	7,755	1,108	309
21	June 4, 1915	21,340	1,016	" 5, 1915	28,880	1,371	355
20	" 9, 1915	18,300	915	" 5, 1915	23,920	1,196	281
Total...102		88,384	866		124,895	1,224	358

The section of land in question produced sufficient pasture to carry the 102 head of steers and four cows nicely. Whether or not this land will prove of equal value in the production of pasture in 1916 is yet to be tested. The grass was not pastured injuriously close, however, and the expectation is that an equal number of cattle could be carried on this land each year. The cattle were brought in from pasture during the first week of November, and since it had been impossible to provide the necessary corral accommodation prior to this date, it was necessary to run them in a comparatively small field for about three weeks until the corrals and feed racks were completed. The cattle were then divided into five groups of practically equal merit as individuals and of about the same total weight. The feeding of grain was begun on December 1, each group being fed the same grain ration, which consisted of equal parts of oats and barley, well ground, and in the beginning was fed at the rate of three pounds per head per day. The ration was increased one pound per head per day each week until each group was receiving ten pounds per head per day, at which rate they were carried until sold. The bulky fodder varied with each group and was fed as follows:—

Group 1.—Prairie hay.
" 2.—Prairie hay and oat straw.
" 3.—Prairie hay and green sheaves.
" 4.—Green sheaves.
" 5.—Timothy hay and alsike hay.

The following table shows the amount of feed consumed, the gains made, the cost of gain and the profit per head on the basis of the cost figures used:—

		Lot No. 1. Prairie hay.	Lot No. 2. Prairie hay and oat straw.	Lot No. 3. Prairie hay and green sheaves.	Lot No. 4. Green sheaves.	Lot No. 5. Timothy & alsike hay.
Number of steers in lot		20	118	19	20	20
First weight, December 4, 1915	lb.	24,010	21,537	22,838	23,390	24,200
First average weight	"	1,200·5	1,196·5	1,202·0	1,169·5	1,210·0
Finished weight, February 15, 1916	"	26,575	22,538	24,930	25,165	25,545
Finished average weight	"	1,328·7	1,252·1	1,312·1	1,258·25	1,277·2
Total gain in 73 days	"	2,565	1,001	2,092	1,775	1,345
Average daily gain per steer	"	1·756	·762	1·508	1·22	·921
Amount of meal eaten	"	10,760	9,699	10,226	8,443	10,760
Amount of prairie hay eaten	"	44,700	30,795	22,023	.....	.....
Amount of green feed eaten	"	.....	.....	14,822	30,440	.....
Amount of timothy and alsike hay eaten	"	.....	.....	.....	.....	34,075
Amount of straw eaten	"	.....	900	.....	.....	.....
Amount of salt eaten	"	40	40	40	40	40
Gross cost of feed	$	219 85	175 38	231 93	237 13	278 48
Average cost of feed per steer	$	10 99	9 74	12 21	11 86	13 92
Cost of cattle	$	1,440 60	1,292 22	1,370 28	1,403 40	1,452 00
Average value of steers at start	$	72 03	71 79	72 12	70 17	72 60
Cost of 100 pounds gain	$	8 57	17 52	11 09	13 36	20 70
Original cost of steers plus cost of feed	$	1,660 45	1,467 60	1,602 21	1,640 53	1,730 48
Returns from cattle at $7.65 per 100 pounds, less 5 per cent shrinkage and one-half of 1 per cent for insurance	$	1,921 74	1,629 76	1,802 77	1,819 74	1,847 22
Average selling price per steer	$	96 08	90 54	94 88	90 98	92 36
Average increase in value	$	24 05	18 75	22 76	20 81	19 76
Profit on group	$	261 29	162 16	200 56	179 21	116 74
Profit per head	$	13 06	9 01	10 56	8 96	5 84

Group 1 receiving prairie hay made fair gains, were consistent, steady feeders and were well finished when sold.

Group 2 was practically a repetition of group 1, since the cattle did not elect to consume any oat straw. In this group as well as in group 3 two racks were used for the bulky fodders, one for each class of fodder. It has been frequently claimed that cattle will eat oat straw voluntarily even though they have access to hay. We did not have this experience during the past year and whether this would be repeated every year or whether it was the result of poorer straw this season would have to be determined by further trials. The Aphis (*Aphidius nigripes*) made its appearance in this district this year and many farmers claimed that the feed value of the straw has been lessened by the effect of this insect upon it.

Group 3 received prairie hay and green sheaves, dividing the ration fairly equally of their own volition and made as good gains as any group.

Group 4 received green sheaves only. This group was the only one to go off its feed during the trial. These cattle scoured more or less and did not make the same steady use of their feed as did other groups in this test.

Group 5 received a mixture of timothy hay and alsike clover, were well finished at the conclusion of the test and weighed out well.

These cattle were all fed in the open, and owing to the extreme weather during the month of January when the mean temperature was −13·5°, the total gain for the feeding period was low. Such extreme weather has not been experienced since this Station began to take meteorological observations in 1907. An extreme change at

the time the cattle were sold was also responsible for their showing a comparatively low gain. The temperature moderated 112 degrees in a comparatively short time and the cattle refused to eat or drink and stood panting in the corrals for some days prior to the time they were finally weighed for shipment.

The cattle made a profit during the finishing period after paying for feed of $611.40, and for the entire period from purchase to shipment a net profit over feed of $1,507.65.

EXPERIMENTAL STATION, INVERMERE, B.C.

REPORT OF THE SUPERINTENDENT, G. E. PARHAM.

STEER FEEDING EXPERIMENT.

Feeding experiments were conducted with two steers last season, to ascertain whether, under local conditions, it was possible to buy, fatten and sell steers at a profit.

There was a considerable crop of roots grown on the Station, which were used for this experiment.

Two steers were purchased on February 22, weighing respectively 1,075 and 900 pounds. They were fed until May 16, and consumed in that time:—

3,437 pounds of hay at $20 per ton	$34 37
8,872 pounds of roots at $3 per ton	13 20
236 pounds of cornmeal, $2.25 per cwt	5 31
112 pounds of shorts, $1.95 per cwt	2 18
Total cost of feed consumed in 83 days	$55 06

This, added to the initial cost of the steers, which were purchased at 6¼ cents for $123.43, made them cost at the date of sale, $178.59. The market price at the time they were sold at 7½ cents, which is not so good a price as might have been reasonably expected when compared with the market quotations at the time of purchase. The proceeds from the sale of the steers amounted to $164.48, showing a net loss on the transaction of $14.01. The following figures may be of interest:—

	Pounds.		Pounds.
Live weight of steer "A" February 22	1,075	Steer "B" February 22	900
" " May 16	1,170	" May 16	1,023
Increase weight of steer, 85 days	95	" 85 days	123
Purchase price of steer, 6¼ cents	$67 18	" 6¼ cents	$56 25
Sale price of steer, 7½ cents	87 75	" 7½ "	76 73
Gross profit of steer	20 57	"	20 48

Total gross profit	$41 05
Cost of feed	55 06
Net loss on experiment	$14 01

DAIRY CATTLE

CENTRAL EXPERIMENTAL FARM, OTTAWA, ONT.

REPORT OF THE DOMINION ANIMAL HUSBANDMAN, E. S. ARCHIBALD, B.A., B.S.A.

DAIRY CATTLE.

There are in all 166 head of cattle in the barns at Ottawa, comprising 120 head of pure-breds and 46 head of grade milch cows, heifers and steers. All dairy cattle are kept for experimental breeding and feeding work.

PURE-BRED BREEDING CATTLE.

Ayrshires, 39, including 16 milch cows, 19 heifers, 4 bulls.
Canadians, 26, including 7 milch cows, 13 heifers, 6 bulls.
Holsteins, 33, including 16 milch cows, 12 heifers, 5 bulls.
Jerseys, 22, including 11 milch cows, 8 heifers, 3 bulls.

GRADE CATTLE.

Grade Ayrshires, 18, including 7 milch cows, 8 heifers, 3 steers.
Grade Holsteins, 28, including 12 milch cows, 12 heifers, 4 steers.

AYRSHIRES.

The Ayrshire herd continues to show very marked improvement. Aside from the splendid natural development of the herd both as to increase in number and in quality, a few careful purchases have been made during the past year. Four exceedingly fine quality Ayrshire heifers were purchased from Mr. A. S. Turner, of Ryckman's Corners, Ont. A bull calf was also purchased from the same party. This calf is by the bull "Netherland King Theodore"—35757, and out of the splendid cow "Betsy Brown"—30888, which cow has a record of over 15,000 pounds of milk, 646 pounds butter-fat, and calved within the year. This calf will be retained in the herd as junior herd sire. The herd is still headed by the bull "Burnside Masterpiece"—43068, a half brother to the famous "Perfect Piece." The calves from this senior sire show exceptional promise both as to type and production.

FRENCH CANADIANS.

Although this herd has not increased in numbers during the past year, yet the quality of the herd is rapidly improving. Unfortunately all the calves were of the male sex and the excellent purchase of females made was more than offset by the number of aged cows which of necessity were turned off to the butcher. The splendid 2-year-old bull "Delphis de Cap Rouge"—3283, transferred from the Experimental Station at Cap Rouge, Que., continues to give excellent satisfaction. During the past year seven females were purchased from A. Denis, St. Norbert, Que., and Macdonald College, Que. These animals were mostly bred by such well-known breeders as A. Denis, V. Sylvestre, and others. The high production of these cows will make a very noticeable improvement in this herd.

GUERNSEYS.

During the past year it was considered advisable to dispose of the Guernsey herd. Although this herd showed good profits and was developing normally as to numbers, yet there were many difficulties to be overcome. There are practically no breeders of Guernsey cattle in Central Canada, the very few who are still retaining this breed being very widely scattered. Hence there was great difficulty in making this herd profitable in the sale of breeding stock or useful to the large majority of dairy farmers throughout Central Canada. Moreover, the difficulty in obtaining fresh blood for herd sires entailed constant importations from Guernsey Island or the United States. An opportunity afforded itself to dispose of this herd to parties in British Columbia who are carrying on the breeding of Guernseys very extensively and can make excellent use of this herd in improving the breed throughout that part of the western provinces. Although it was with regret that this herd was disposed of, yet much better work is being done with dairy cattle through the advantage of having fewer breeds to work with.

HOLSTEINS.

The Holstein herd has made fully as rapid improvements as any other herd in the stables. A number of carefully selected purchases have been made during the past year and these have done exceedingly well. One of the most notable purchases was a junior 2-year-old heifer, "May Echo Posch," closely related to the famous "May Echo Sylvia." Details of her excellent production as a junior 3-year-old will be found in the latter part of this report. Other purchases in this breed were: a junior 3-year-old, "Rosa Bonheur Flower," grand champion at Toronto, September, 1915; "Lady Jane of Burnbrae 2nd," grand champion at Sherbrooke, 1915. Many heifers bred on the Central Experimental Farm have also made exceptional showing during the past year. The senior herd bull, "Sir Johanna Ormsby of Hickory"—18811, a grandson of "Sarcastic Lad" and a son of a 22,000-pound cow, continues to give excellent satisfaction. The junior herd sire, "Lyons Segis Posch"—24903, is the son of "May Echo Posch" and contains over 50 per cent the same blood as "May Echo Sylvia." These are two excedingly promising bulls both as to individuality and breeding.

JERSEYS.

The Jersey herd during the past year has progressed favourably. Unfortunately the larger proportion of the progeny was of the male sex, and in consequence the increase in numbers in this herd was due largely to some careful purchases made from B. H. Bull & Sons, Brampton, Ont. Four head of cows and heifers were purchased, which have very materially strengthened this breed. The senior herd sire, "Brampton Mon Plaisir"—1886, continues to give excellent satisfaction. The junior herd sire, "Ottawa Prince"—6600, a calf of great promise, is by the famous bull, "Viola's Bright Prince," probably the most outstanding sire of Jerseys in Canada and one of the greatest of the breed.

SALES OF BREEDING STOCK.

During the past year many excellent young bulls have been sold, at reasonable figures, to farmers and agricultural societies. These are all excellently bred for milk and of splendid type, and undoubtedly will be heard from both as sires and as representative examples of the breeds.

OTTAWA.

SUMMER FEEDING.

The summer of 1915 was most satisfactory for pasture. The rains, evenly distributed throughout the summer, provided excellent grass and in consequence both the young growing stock and the producing cows had most excellent environments. Very fortunately an area of about 80 acres almost adjoining the Experimental Farm was temporarily rented for pasture purposes. This pasture carried over forty head of heifers and cows throughout the summer. This is the first opportunity which yearling heifers have had to develop properly on pasture, and the marked improvement in our yearling heifers of all breeds, the improved condition in which they went into the barns in the fall, and the cheapness of wintering in good condition were most noticeable. Whatever might be said in favour of the use of soiling crops for the supplementing of scant or poor pastures for the milch cows or other live stock, there is little doubt that for the proper development of dairy heifers good pasture is an essential.

Attention is drawn to the fact that the cost of feeding the dairy cattle during the past year was somewhat lower than in the previous year, due to the large quantity of excellent ensilage provided by the Field Husbandry Division. A careful study of the feeding and management of dairy cattle on the Central Experimental Farm proves conclusively the tremendous value of corn ensilage, not only for winter but also for the summer feeding of mature dairy stock.

WINTER FEEDING.

The winter feeding was conducted under most favourable conditions. The new buildings, previously reported, are eminently satisfactory both for the health and comfort of the animals, the convenience in feeding and handling the dairy products, and also the convenience for inspection by the many thousands of visitors. Although the summer season was most favourable toward pastures, yet the quality of some of the roughages for winter feeding was seriously impaired. The hay crop probably suffered more than others, particularly the second and third cutting of alfalfa and clover. However, a large quantity of hay was put up, which has amply provided the live stock with this character of roughage during the winter just completed. The corn ensilage was of first-class quality, rich in grain, and was excellently preserved in spite of the great difficulties met in the harvesting of this crop due to the very wet condition of the land. The roots were short in quantity and the turnips were of very poor keeping quality; hence, this class of roughage was all too limited for the feeding of the cattle, sheep, and swine. Unfortunately, also, the straw from the grain crops was very badly weathered and was of very low feeding quality in comparison with other years.

The aged cattle entered the barns in the fall in excellent flesh and produced splendidly during the winter months. The winter ration per day for milch cows was, on an average, about as follows: Hay, 5 pounds; corn ensilage, 25 pounds; roots (when available), 10 pounds; straw, 5 pounds; and meal, 7 pounds. The meal mixture consisted of bran, 700 pounds; gluten feed, 400 pounds; cottonseed meal, 200 pounds; ground oats, 200 pounds; peanut oil meal, 200 pounds; and linseed oil meal, 100 pounds.

The meal was fed on top of the ensilage in manger. The hay was given uncut, after the other materials had been cleaned up. Generally speaking, the milch cows were allowed all the roughage they would consume, and the meal was fed in proportion to the milk produced, usually at the rate of 1 pound for every 4 to 4½ pounds of milk produced. A careful study was made of this ratio between meal and milk, the results of which will be reported on at a later date.

As in former years, water was before the cows at all times. The salt was added to the roughage at the time of mixing.

OTTAWA.

DAIRY CATTLE FEEDING EXPERIMENTS.

Experiments in the feeding of dairy cows both in the summer and winter were conducted during the past year. The supervision of the work of these experiments and the compiling of the data given herewith were conducted by Mr. G. W. Muir, second assistant in this Division.

Experiment No. 1.

SUMMER FEEDING IN BARN. CORN ENSILAGE *vs.* GREEN FEED.

The summer feeding of dairy cattle has become a question of great importance to the dairy farmer. The increase in land values has caused a reduction of the acreage of arable land which it is profitable to use for pasture purposes, and this, together with the fact that the pastures are prone to dry up during the hot summer months, has caused the farmer to look to other sources for an abundance of succulent food for his dairy cows. This he can obtain in two forms, i.e., in the shape of silage of the previous year's manufacture, or in the form of green soiling crops, these latter to be sown on different dates with the idea of providing the cattle with food which is not too immature nor too ripe to be both nutritious and palatable. It was with this thought in mind that the present line of experiments was outlined.

OBJECT OF EXPERIMENT.

The object of this experiment was to compare the relative values of corn ensilage of the previous year's manufacture with a soiling crop, which in this case consisted of peas and oats. The experiment was carried on during June, July and August, in three tri-weekly periods. In the first and third periods ensilage and hay were used as roughages, 30 pounds of the former and 6 of the latter per day. During the second period the peas and oats were fed and the hay eliminated from the ration, as the cows would not touch it while having the green feed. During the first two weeks of the second period the cows consumed 75 pounds per day, but as the green feed became more mature they ate less, so that they consumed on an average about 68 pounds per day.

The meal ration was composed as follows:—

Bran	4 parts.
Gluten meal	2 "
Cottonseed meal	1 "
Oil meal	1 "
Barley meal	1 "

This was fed at the rate of 1 pound for every 3 pounds of milk produced in the first period and the same quantity per cow per day during the succeeding periods.

The first week of each period was considered as a transition period, and the data obtained during that time discarded, so that the effect of the change from one ration to another would not appear in the results.

The weights of the cows were taken at the beginning of the experiment and at the end of each period, and are embodied in the table of results for comparative purposes.

Samples of all meals used in the experiment were taken for analysis, for the results of which the reader is referred to the report of the Dominion Chemist, Dr. Frank T. Shutt.

Prices of feeds used in the experiment were as follows:—

Meal mixture	$30 00 per ton.
Ensilage	2 00 "
Hay	7 00 "
Green feed	3 00 "

Following is a table of results:—

DAIRY COW FEEDING EXPERIMENT NO. 1.

Experimental Ration.	Period 1.	Period 2.	Period 3.	Average of Periods 1 and 3.
	Silage.	Peas and Oats.	Silage.	Silage.
Number of cows in test	18	18	18	18
Pounds milk produced by 18 cows lb.	7,701·5	7,947·5	7,786·5	7,744·0
Average milk per cow per day "	30·5	31·5	30·9	30·7
Average per cent fat in milk p.c	3·86	3·77	3·98	3·92
Total pounds fat produced by 18 cows lb.	297·64	300·32	310·67	304·15
Average pounds fat per cow per day "	1·18	1·19	1·23	1·20
Total meal consumed "	2,667·0	2,667·0	2,667·0	2,667·0
Total silage consumed "	7,560·0	.....	7,560·0	7,560·0
Total green feed consumed "	.....	17,136·0	.....	.....
Total hay consumed "	1,512·0	.....	1,512·0	1,512·0
Hay and silage, or green feed, consumed per 100 pounds fat produced "	3,048·0	5,705·0	2,920·0	2,984·0
Hay and silage, or green feed, consumed per 100 pounds milk produced "	1,177·0	2,156·0	1,171·0	1,174·0
Findings from Experiment.				
Average weight of cows at end of period lb.	1,060	1,095	1,093	1,076
Cost of meal mixture fed $	40 00	40 00	40 00	40 00
Cost of silage fed $	7 56	.....	7 56	7 56
Cost of green feed fed $	.....	25 70	.....	.....
Cost of hay fed $	5 29	.....	5 29	5 29
Total cost of feed $	52 85	65 70	52 85	52 85
Cost to produce 100 pounds fat $	17 75	21 87	17 01	17 38
Cost to produce 1 pound fat cts.	17·7	21·8	17·0	17·3
Cost to produce 1 pound butter, 85 per cent "	15·0	18·5	14·4	14·7
Profit on 1 pound butter at 30 cents "	15·0	11·5	15·6	15·3
Cost to produce 100 pounds milk "	68·6	82·6	67·8	68·2
Profit on 100 pounds milk at $1.70 "	101·4	87·4	102·2	101·8

From the foregoing results the following conclusions may be drawn:—

1. That the abundance of succulent green forage has the power to increase milk production over and above that obtained by the feeding of silage, as seen by the increase of 246 pounds in the second period of the experiment.

2. That, as was to be expected, the heavy feeding of a roughage with a high water content and comparatively low nutritive ratio caused the lowering of the average per cent of fat in the milk. This lowering of the per cent fat was sufficiently overcome by the greater production of milk to make them more than balance, however.

3. The cost of production of both milk and butter-fat was much greater when green feed was used. Here we have the most significant fact in the whole experiment, and when the time required to handle the green feed as compared with that required to handle silage is taken into consideration, this fact is made still more important.

Experiment No. 2.

COMPARATIVE VALUE OF CONCENTRATED PROTEINS.

The average farmer is unable to produce sufficient of the highly proteinaceous foods to supply the wants of a large dairy herd, nor is it considered profitable for him to try to do so. By purchasing these concentrates and turning his attention to the growing of large amounts of succulent and palatable roughages, the farmer increases

the stock-raising capacity of his farm and at the same time is adding considerable fertilizing constituents in a very cheap form. The present line of experiments was outlined in an endeavour to help the farmer to choose his concentrates.

OBJECT OF EXPERIMENTS.

The object of the experiment was to compare the relative value, palatability and economy of three of the most commonly used protein feeds, namely, linseed oil cake, cottonseed meal and gluten feed, as well as two new feeds which have only lately been put on our markets, namely, fish meal and peanut oil meal.

PLAN OF EXPERIMENT.

As many cows as could be had, that were giving a sufficient quantity of milk to be affected by such a small change in the ration, were used in the different divisions of this experiment.

The meal mixtures and dates of periods are given herewith. It will be noticed that the cows got the same number of pounds of protein in each period although the nutritive ratio may vary somewhat.

Period.	Date starting.	Meal mixture for period—pounds.
1.....	Dec. 7, '15.....	Gluten feed, 400; bran, 400; ground oats, 200.
2.....	Dec. 21, '15.....	Fish meal, 85; bran, 400; ground oats, 200; gluten feed, 200;
3.....	Jan. 4, '16.....	Gluten feed, 400; bran, 400; ground oats, 200.
4.....	Jan. 18, '16.....	Cottonseed, meal 125; bran, 400; ground oats, 200; gluten feed, 200.
5.....	Feb. 1, '16.....	Gluten feed, 400; bran, 400; ground oats, 200;
6.....	Feb. 15, '16.....	Linseed oil cake, 170; gluten feed, 200; bran, 400; ground oats, 200.
7.....	Feb. 29, '16.....	Gluten feed, 400; bran, 400; ground oats, 200.
8.....	Mar. 14, '16.....	Peanut meal, 110; gluten feed, 200; bran, 400; ground oats, 200.
9.....	Mar. 28, '16.....	Gluten feed, 400; bran, 400; ground oats, 200.

As will be noted, each period consisted of two weeks, the last week only being used for computation, the first being considered as a transition period.

During the first period, all cows received as much roughage as they would clean up and the same amount during the remainder of the experiment. This amounted to approximately 10 pounds of turnips, 35 pounds of ensilage and 6 pounds of hay per cow per day.

The grain mixture was fed at the rate of 1 pound for every 3½ pounds of milk produced during period I and this amount was continued per cow per day during the following periods. Any grain refused was removed, weighed, and credited to the cow.

Samples of the various meals were taken for analysis, for the results of which the reader is referred to the report of the Dominion Chemist, Dr. Frank T. Shutt, which will be found elsewhere in this issue.

All grain feed was weighed out to the cows at each feed and the roughages were weighed often enough to give fairly accurate results.

The cows were weighed at the beginning of the experiment and at the end of each period thereafter.

Value of Feeds per Ton.—Hay, $7; turnips and ensilage, $2; bran, $20.50; gluten feed, $32; oil cake, $38; cottonseed meal, $33; fish meal, $80; ground oats, $30; peanut meal, $40.

OTTAWA.

Part I.—Fish Meal vs. Gluten Meal.

The following is a summary of the test of gluten feed against fish meal where 200 pounds of the former was replaced by 85 pounds of the latter in the ration:—

Dairy Cow Feeding Experiment No. 2 (Part I).

Experimental Ration.		Period 1.	Period 3.	Periods 1 and 3 Average.	Period 2
		Gluten feed	Gluten feed.	Gluten feed.	Fishmeal.
Number of cows in test	No.	21	21	21	21
Pounds of milk produced by 21 cows	lb.	3,557·5	3,293·0	3,425·2	3,537·0
Average milk per cow per day	"	24·2	22·4	23·3	24·0
Average per cent fat in milk	p.c.	3·8	·39	3·85	3·9
Total pounds fat produced by 21 cows	lb.	135·2	128·4	131·8	137·9
Average pounds fat per cow per day	"	·92	·87	·89	·94
Total meal consumed	"	1,151·5	1,151·5	1,151·5	1,151·5
Total hay consumed	"	882·0	882·0	882·0	882·0
Total roots consumed	"	1,470·0	1,470·0	1,470·0	1,470·0
Total ensilage consumed	"	5,145·0	5,145·0	5,145·0	5,145·0
Mixture consumed per 100 pounds fat produced	"	851·7	896·8	874·0	835·0
Mixture consumed per 100 pounds milk produced	"	32·4	34·9	33·6	32·5
Findings from Experiment.					
Cost of meal mixture fed	$	15 54	15 54	15 54	17 80
Value of roughage fed	$	9·70	9 70	9 70	9 70
Total cost of feed	$	25 24	25 24	25 24	27 50
Cost to produce 100 pounds fat	$	18 66	19 65	19 15	19 94
Cost to produce 1 pound fat	$	·186	0·196	0·191	0·199
Cost to produce 1 pound butter	$	0·159	0·167	0·163	0·169
Profit on 1 pound butter at 30 cents per pound	$	0·141	0·133	0·137	0·131
Cost to produce 100 pounds milk	$	0·709	0·766	0·737	0·777
Profit on 100 pounds milk at $1.70 per hundred-weight	$	0·991	0·934	0·962	0·923
Total weight of cows for period	lb.	22,818	23,360	.....	23,592
Gain or loss in weight	"	Loss 231	Loss 232		Gain 774

The fish meal used in this part of the experiment was procured from Great Britain. It is made from whole fish specially prepared and ground into a fine meal. It contains 61·5 per cent albuminoids, 3 per cent oils or fat, and 19·83 per cent phosphate of lime. It has a somewhat rancid odour which would lead one to think that it would be unpalatable to cattle but it was found that this was not the case. For the first few feeds the grain was nosed around but thereafter it was eaten with increasing relish and the appetites of the cattle increased quite perceptibly. This was no doubt due to the tonic effect of the phosphate of lime present in the fish meal. It will be noticed also that it is a little superior to gluten feed from the milk production standpoint, there being a gain of 111·8 pounds, but this gain was more than overcome by the increased cost of feed for the period. As only 9·6 per cent fish meal was used in the ration, no objectionable odours were detected in the milk but other experimentalists claim that a higher percentage will cause a taint in the milk. Usually not much stress is laid on the variation in weight of dairy cattle when on experiment, owing to the number of factors involved that would cause variation, but in this case the average gain per cow of 37 pounds is so unusual as to be worthy of note. The conclusions to be drawn from the above are: (1) that although fish meal is too expensive for profitable feeding to dairy cattle in large quantities, it might be used to advantage in small quantities for the sake of its tonic effect; (2) that, judging from its effect on the weight of the cattle, it is probably better suited to feeding to beef animals and more investigation along this line is warranted.

Ottawa.

Part II.—Cottonseed Meal vs. Gluten Feed.

Following is a summary of the test of gluten feed against cottonseed meal, where 200 pounds of the former was replaced by 125 pounds of the latter in the ration:

Dairy Cow Feeding Experiment No. 2 (Part II.)

Experimental Ration.		Period 3.	Period 5.	Periods 3 and 5. Average.	Period 4.
		Gluten feed.	Gluten feed.	Gluten feed.	Cottonseed.
Number of cows in test	No.	17	17	17	17
Pounds of milk produced by 17 cows	lb.	3,089·5	3,156·0	3,122·7	3,059·5
Average milk per cow per day	"	26·0	26·5	26·2	25·7
Average per cent fat in milk	p.c.	3·9	3·86	3·88	3·9
Total pounds fat produced by 17 cows	lb.	120·49	121·82	121·15	119·32
Average pounds fat per cow per day	"	1·01	1·02	1·01	1·00
Total meal consumed	"	987·00	987·00	987·00	987·00
Total hay consumed	"	714·00	714·00	714·00	714·00
Total roots consumed	"	1,190·00	1,190·00	1,190·00	1,190·00
Total ensilage consumed	"	4,165·00	4,165·00	4,165·00	4,165·00
Mixture consumed per 100 pounds fat produced	"	819·10	810·21	814·65	827·10
Mixture consumed per 100 pounds milk produced	"	31·94	31·27	31·60	32·26
Findings from Experiment.					
Cost of meal mixture fed	$	13 32	13 32	13 32	13 18
Value of roughage fed	$	7 85	7 85	7 85	7 85
Total cost of feed	$	21 17	21 17	21 17	21 03
Cost to produce 100 pounds fat	$	17 56	17 37	17 46	17 62
Cost to produce 1 pound fat	$	0·175	0·173	0·174	0·176
Cost to produce 1 pound butter	$	0·149	0·147	0·148	0·149
Profit on 1 pound butter at 30 cents per pound	$	0·151	0·153	0·152	0·151
Cost to produce 100 pounds milk	$	0·685	0·670	0·677	0·687
Profit on 100 pounds milk at $1.70 per hundredweight	$	1·015	1·030	1·023	1·013
Total weight of cows for period	lb.	18,082	18,879	.....	18,495
Gain or loss in weight	"	Loss 295–	Gain 384	.....	Gain 413

At the prices quoted, which are more favourable to cottonseed meal than to gluten feed, the latter has a slight advantage over the former in the amount of milk produced, though the cost of production is a little higher but not sufficiently so to offset the gains. Here a steady gain in the weight of the cows will be noticed but it is not much more than can be attributed to the natural gain with cows carrying calves.

16—1916—30a.

Refrigerator milk can, built with double walls, Central Experimental Farm, Ottawa.

Ordinary single jacket milk can, Central Experimental Farm, Ottawa.

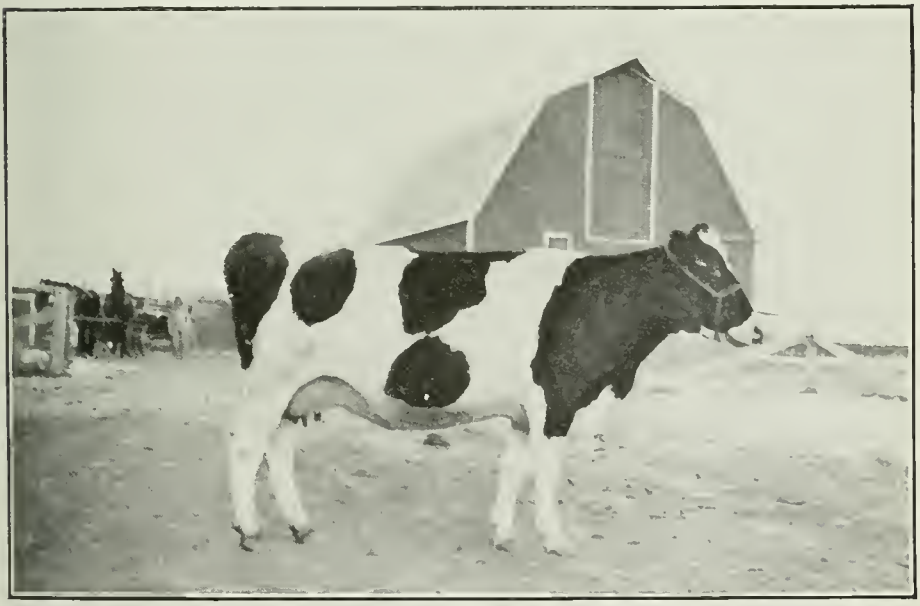
Some pure bred Ayrshire cows and heifers, Experimental Station, Ste. Anne de la Pocatière, P.Q.

Ayrshire heifer calves. Sire, "Chieftain of Riverside", Experimental Station, Ste. Anne de la Pocatière, P.Q.

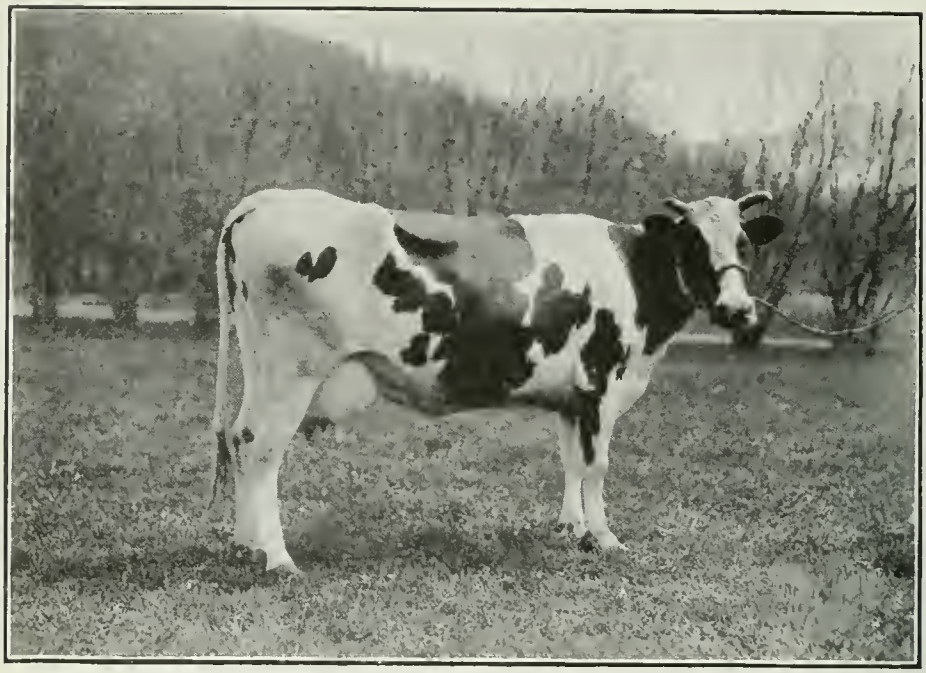
Brandon: Butterfly King 21st, senior stock bull. Milking strain Shorthorn. Picture taken at 7½ years of age.

The cow here shown will produce no more during the entire lactation period than the dam of the bull was capable of producing in 30 days. What will be the production of the calf? Lacombe Station.

Lacombe, Alta. Holstein Grade No. 20. Average production of the grade herd of which this cow is a type was 10,868·5 lb. for one lactation period.



Lacombe, Alta. Daisy Johanna Ormsby 18324. Official R. O. P. record, as a two year old, 9,285 lb. milk, 407 lb. fat.



Agassiz, B.C. Agassiz Pietje Korndyke, 26407. Born Sept. 3rd, 1913. At 2 years 4 months 5 days 405·9 lb. milk, 17·18 lb. butter, 7 days ; 1,656·1 lb. milk, 70·46 lb. butter 30 days; 3,221·3 lb. milk, 137·55 lb. butter 60 days. Sire : Sir Natoye Korndyke, 13840, (2-0). Dam: Pietje Priscilla Mechthilde, 14123, 15,556 lb. milk, 681 lb. butter, 349 days.

Agassiz, B. C. Pietje Priscilla Mechthilde, 14123. Born July 24th, 1909. At 4 years 554·6 lb. milk, 20·58 lbs. butter 7 days ; 6 years 15,556 lb. milk, 681 lb. butter 349 days. Two consecutive years the most profitable cow in the herd, producing 31,458 lb. of milk, 1,356 lb. butter. Sire: Canary Mechthilde, 5318, (24 daughters 1 son) A.R.O. (6 daughters 0 sons) R.O.P. Dam: Pietje Priscilla, 6868, 524·9 lb. milk, 24.58 lb. butter.

Agassiz, B. C. Junior Herd Bull, B. C. Korndyke Choice. 18994.

Agassiz, B. C. Grade heifer calves, 7 months old, sired by the Junior herd bull, B. C. Korndyke Choice, 18994.

PART III.—GLUTEN FEED VS. LINSEED OILCAKE.

Following is a summary of the trial of gluten feed against oilcake meal where 200 pounds of the former was replaced by 170 pounds of the latter in the ration:—

DAIRY COW FEEDING EXPERIMENT NO. 2 (PART III.)

Experimental Ration.		Period 5.	Period 7.	Periods 5 and 7. Average.	Period 6.
		Gluten feed.	Gluten feed.	Gluten feed.	Oil cake.
Number of cows in test	No.	18	18	18	18
Pounds milk produced by 18 cows	lb.	3,523·5	3,202·0	3,362·7	3,436·5
Average milk per cow per day	"	27·9	25·4	26·6	27·3
Average per cent fat in milk	p.c.	3·83	3·82	3·83	3·91
Total pounds fat produced by 18 cows	lb.	135·23	122·38	128·80	134·49
Average pounds fat per cow per day	"	1·04	0·97	1·01	1·07
Total meal consumed	"	1,071·00	1,071·00	1,071·00	1,071·00
Total hay consumed	"	756·00	756·00	756·00	756·00
Total roots consumed	"	1,260·00	1,260·00	1,260·00	1,260·00
Total ensilage consumed	"	4,410·00	4,410·00	4,410·00	4,410·00
Mixture consumed per 100 pounds of fat produced	"	791·98	875·14	833·56	796·34
Mixture consumed per 100 pounds of milk produced	"	30·39	33·44	31·91	31·16
Findings from Experiment.					
Cost of meal mixture fed	$	14·45	14·45	14·45	14·94
Value of roughage fed	$	8·32	8·32	8·32	8·32
Total cost of feed	$	22·77	22·77	22·77	23·26
Cost to produce 100 pounds of fat	$	16·83	18·60	17·76	17·29
Cost to produce 1 pound of fat	$	0·168	0·186	0·177	0·172
Cost to produce 1 pound of butter	$	0·143	0·158	0·150	0·147
Profit on 1 pound of butter at 30 cents per pound	$	0·157	0·142	0·150	0·153
Cost to produce 100 pounds of milk	$	0·646	0·708	0·677	0·677
Profit on 100 pounds of milk at $1.70 per hundredweight	$	1·054	·992	1·023	1·023
Total weight of cows for period	lb.	20,019	20,350	.....	20,188
Gain or loss in weight	"	Gain 359	Gain 162	.....	Gain 169

In the foregoing experiment, oil cake meal had a tendency to keep up the milk flow to a certain extent, there being a gain of 73·8 pounds, but this was not sufficient to overcome the increased cost of the ration so that milk was produced at exactly the same price in both cases. It would seem, however, that the oil cake meal had a tendency to increase the fat in the milk, the difference being 0·08 per cent. This resulted in a lessened cost of production for butter in the oil cake meal period. The variation in the weights of the cows is too small to attach any importance thereto.

PART IV.—GLUTEN FEED VS. PEANUT MEAL.

Dairy Cow Feeding Experiment No. 2 (Part IV).

Experimental Ration.	Period 7.	Period 9.	Periods 7 and 9 Average.	Period 8.
	Gluten feed.	Gluten feed.	Gluten feed.	Peanut meal
Number of cows in test.....No.	17	17	17	17
Pounds of milk produced by 17 cows..... lb.	3,345	3,202	3,273·5	3,253
Average milk per cow per day..... "	28·10	26·91	27·50	27·34
Average per cent fat in milk.....p.c.	3·85	3·94	3·89	3·58
Total pounds produced by 17 cows..... lb.	128·72	126·30	127·51	116·68
Average pounds fat per cow per day..... "	1·08	1·06	1·07	0·98
Total meal consumed..... "	1,060·50	1,060·50	1,060·50	1,060·50
Total hay consumed..... "	714	714	714	714
Total roots consumed..... "	1,190	1,190	1,190	1,190
Total ensilage consumed..... "	4·165	4,165	4,165	4,165
Mixture consumed per 100 pounds fat produced.... "	823·90	839·60	831·75	908·89
Mixture consumed per 100 pounds milk produced "	31·70	33·12	32·41	32·60
Findings from Experiment.				
Cost of meal mixture fed..... $	14·32	14·32	14·32	14·56
Value of roughage fed..... $	7·86	7·85	7·85	7·85
Total cost of feed..... $	22·17	22·17	22·17	22·41
Cost to produce 100 pounds fat..... $	17·22	17·55	17·38	19·20
Cost to produce 1 pound fat..... $	0·172	0·175	0·173	0·192
Cost to produce 1 pound butter..... $	0·146	0·149	0·147	0·163
Profit on 1 pound butter at 30 cents per pound.... $	0·154	0·151	0·153	0·127
Cost to produce 100 pounds of milk..... $	0·662	0·692	0·677	0·688
Profit on 100 pounds of milk at $1.70 per hundredweight..... $	1·038	1·008	1·023	1·012
Total weight of cows for period..... lb.	19,038	18,957	.....	19,063
Gain or loss in weight..... "	Gain 168	Loss 105	.....	Gain 25

The peanut meal used in the foregoing experiment is a by-product in the manufacture of peanut oil and is made up of the residue of the kernel after the oil is pressed out, together with a certain portion of the husks. If the latter are present in too large quantities they impart a bitter flavour to the meal, making it unpalatable and at the same time unnutritious, owing to their high fibre content. The brand used was of very good quality and was very well relished by the cows when it formed a little over ten per cent of the total meal ration. The results obtained, however, were not very satisfactory as there was a considerable drop both in the amount of milk and fat produced, particularly the latter. This caused an increase of two cents per pound in the cost of production of a pound of butter.

SUMMARY.

The object of this experiment, as stated previously, was to compare the relative value, palatability and economy of the feeds used. Taking first the question of palatability, it may be said that in the proportions used all the meals were palatable as they were all eaten readily. However, it is just possible that in the case of the fish meal and peanut meal larger quantities in the ration would affect the palatability, because the former is inclined to be a little rancid owing to the presence of some oils, while the latter is slightly bitter due to the presence of the peanut hulls.

The relative value and economy of the meals can be arrived at from a study of the following table, in which the various feeds are classed in the order of their cheap-

ness for production of milk and of butter, and also showing the cost of the grain ration per cow per period, together with the nutritive ratio of the same. Hence the order of value of these meals at above mentioned prices is: Oil cake meal, gluten feed, cottonseed meal, peanut oil meal, fish meal.

Feeding periods.	Meal.	Cost to produce 100 lb. milk.	Cost to produce 1 lb. butter.	Cost of grain ration per cow per period.	Nutritive ratio of grain ration.
		cts.	$	$	
Period 6	Oil cake	67·7	14·7	1·29	1 : 3·0
" 5 and 7	Gluten feed	67·7	15·0	1·25	1 : 3·6
" 4	Cottonseed meal	68·7	14·9	1·24	1 : 3·1
" 3 and 5	Gluten feed	67·7	14·8	1·25	1 : 3·6
" 8	Peanut meal	68·8	16·3	1·32	1 : 3·0
" 7 and 9	Gluten feed	67·7	14·7	1·25	1 : 3·6
" 2	Fish meal	77·7	16·9	1·31	1 : 2·96
" 1 and 3	Gluten feed	73·7	16·3	1·25	1 : 3·6

As previously stated, the amount of the various meals used was based on their protein content so that the pounds of protein in the ration would be the same in each case, consequently any change in the amount of milk or butter produced would be brought about by the change in the quality of the protein. At the same time the change to a meal high in protein, such as fish meal, meant a reduction in the amount of meal used, which, even with the higher cost of the meal in question, lowered the cost of the concentrated protein in the ration considerably. This, however, was offset by the fact that an additional amount of the other meals used was necessary to make up the total number of pounds of grain feed in the ration thus balancing up the cost of the grain ration until there was only a difference of eight cents per cow per period between the cost of the cheapest and dearest ration. In studying the foregoing table it must be remembered, however, that the figures given will hold good only when the feeds can be obtained at the prices quoted. Any change in prices will change these figures accordingly.

A further comparison on a strictly commercial basis may be made as follows:—

In part I of this experiment, 110·6 pounds of fish meal plus 44·61 pounds of bran and 22·26 pounds of oats took the place of 215·7 pounds of gluten feed; therefore, with the other three feeds at the prices mentioned, fish meal is worth $48 per ton for milk production.

Similarly in part II, 136·1 pounds of cottonseed meal plus 40·6 pounds of bran and 20·3 pounds of oats took the place of 177·1 pounds of gluten feed; therefore, with the other three feeds at the prices quoted, cottonseed meal is worth $30.86 per ton for milk production.

In part III, 188 pounds of oil cake, plus 3·18 pounds of bran and 2·09 pounds of oats; took the place of 216·82 pounds of gluten feed; therefore, according to the same reasoning, oil cake is worth $36.32 per ton for milk production.

Lastly, in part IV of the experiment, 129.3 pounds of peanut meal plus 45 pounds of bran and 22·5 pounds of oats, took the place of 190·1 pounds of gluten feed; thus giving peanut meal a valuation of $34.65 per ton for milk production.

CALF FEEDING EXPERIMENTS.

During the past year experiments in the feeding of dairy calves were continued on a fairly large scale. The purpose of this investigation is to discover the most economical manner of rearing the thriftiest calves to the age of 6 months. The natural food for the calf, namely whole milk, was compared with various meal substitutes with and without skim-milk and buttermilk. Good home-made calf meals were compared with various patent calf meals commonly found and largely used throughout Canada. All these calf meals contained different percentages of protein, fat, fibre, etc., and careful studies were made to discover the best balanced ration for calf feeding. Until all these calf-feeding experiments are completed in duplicate, it would be unwise to publish results in detail. It is hoped that such work may be completed during the coming fiscal year and all this investigation to date be placed in the hands of the farmer in pamphlet form. There is no doubt that this line of work is exceedingly important, as the quality of Canadian cattle is very seriously impaired by poor rearing, while on the other hand many farmers rear their calves exceedingly well but at too great a cost.

The results of the first group, containing five lots of calves, in this series of experiments were reported in the annual report for the fiscal year ending March 31, 1915. A brief summary of the results of a number of the lots which have completed the feeding trials during the past fiscal year will at least show the work which is under way.

Group 2.—Group 2 contained four lots. The cost of producing 100 pounds gain in each is as follows:—

Home-made calf meal and skim-milk	$ 3 04
Bibby's cream equivalent and skim-milk	3 41
Caldwell's calf meal and skim-milk	4 34
Whole milk	18 74

The last-mentioned lot, while making exceptional gains, did so at far too great a cost, which is to be expected in the whole milk feeding of calves. This lot, however, was a check on the other lots in this group.

Group 3.—This group contained four lots. The cost of producing 100 pounds gain in each is as follows:—

Caldwell's calf meal and skim-milk	$5 45
Home-made calf meal and buttermilk	2 51
" " skim-milk	2 95
Blatchford's calf meal and skim-milk	5 59

The order of greatest gains in this lot is: (1) home-made meal and buttermilk, (2) home-made meal and skim-milk, (3) Caldwell's meal, (4) Blatchford's meal.

Group 4.—Only two lots were contained in this group. Lot 1, fed Royal Purple calf meal and skim-milk, made slightly less gains than lot 2, the cost of 100 pounds gain being $3.83. Lot 2, fed Gold Dollar calf meal and skim-milk, made gains costing $3.64 per hundred pounds.

Group 5.—This group contained also only two lots. Lot 1 was fed whole milk and produced the greatest daily gains, at a cost of $13.27 per hundred pounds. Lot 2, fed Blatchford's calf meal and water (no whole milk or skim-milk), produced fairly good gains, at a cost of $4.92 per hundred pounds. It will be noted that good calves may be reared without milk or milk by-products, providing the calves are given a good start on whole milk for the first two weeks of their lives, but it will also be noted that the cost of producing 100 pounds gain is nearly double the cost of producing 100 pounds gain where a reasonable amount of skim-milk at 20 cents per hundredweight is available.

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Group 6.—Group 6 contained three lots of calves. Lot 1 was fed whole milk and produced gains costing $13.27 per hundred pounds. Lot 2, fed Gold Dollar calf meal and skim-milk, produced gains costing $3.60 per hundred pounds live weight. Lot 3, fed Royal Purple calf meal and skim-milk, produced gains costing $3.98 per hundred pounds live weight. The order of greatest daily gains in this group was: (1) Gold Dollar calf meal, (2) whole milk, (3) Royal Purple calf meal.

Group 7.—This group contained two lots of calves. Lot 1, fed home-made calf meal and skim-milk, produced gains costing $1.94 per hundred pounds live weight. Lot 2, fed home-made calf meal and buttermilk, produced gains costing $1.34 per hundred pounds live weight. This group again demonstrated the great economy of feeding a good home-made calf meal with a dairy by-product, and also the slight superiority of buttermilk over skim-milk both as to cheapness of gains and total gains.

Group 8.—This is a duplication of group 7. The same meals and dairy by-products were used. In this group the lot fed skim-milk produced gains costing $2.76 per hundred pounds, while the lot fed buttermilk produced gains costing $2.87 per hundred pounds. Although this is a slight reversal of previous experiments, yet this is undoubtedly due to the unthriftiness of one of the calves contained in the buttermilk lot.

The above and several other experiments along the same lines are now under completion. It will be noted that much similar work is being conducted on the branch Farms and Stations, and it is hoped that within a few months most specific information regarding the most economical and satisfactory methods of calf rearing may be available.

COST OF REARING DAIRY HEIFERS.

The question is often raised as to whether it is more profitable to raise young cows or to purchase them when either heavy with calf or in milk. For this reason accurate figures have been kept as to costs of calf rearing. This work will be continued for several years to gather this information in all parts of Canada. Undoubtedly the following figures prove the desirability of rearing the best calves on any farm rather than eventually buying the poorest animals of other breeders, it being understood that a wise farmer retains only his best stock.

It will be noticed in this table that such calves as Nos. 1 and 14 were reared on a very expensive ration of whole milk during the first five months.

Twenty heifers were raised to about 6 months on a feed cost ranging from $10.59 to $39.12, an average of $17.80 per head.

Fifteen heifers were raised to 12 months of age on a feed cost ranging from $16.40 to $48.42, an average of $27.01 per head.

Nine heifers were raised to 24 months of age (all safe in calf) on a feed cost ranging from $29.13 to $47.92, an average of $36.70 per head.

In other words, it appears that even when calves are well started on a liberal supply of whole milk, followed by some skim-milk and a good calf meal with dry grains (bran, oats, and oil cake), hay and other roughages as needed, excellent calves may be reared to 24-month heifers very cheaply. The calf well started during the first six months may be fed without grain during the second year and when pastures and good roughages such as clover hay, ensilage and turnips are properly fed these heifers may grow rapidly and be in excellent flesh.

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The prices charged for feeds are as follows:—

Whole milk	per cwt.	$	1 90
Skim-milk	"		20
Calf meal	"	1 90 to	4 00
Dry grain (oats and bran)	"		1 25
Hay	"		35
Ensilage and roots	"		10
Salt	"		40
Pasture, calves under 9 months	per month.		40
" 9 months to 24 months	"		1 00

FEEDS consumed by Heifers.

No.	Name.	Age at end	Pasture	Hay.	Silage and roots.	Meals	Whole milk.	Skim milk.	Cost at age
		Mos.	Mos.	Lb.	Lb.	Lb.	Lb	Lb.	$ cts.
1	Jessie I	5½	.....	130	390	.....	1,512	.....	30 05
		12	3⅙	400	1,240	180	1,512	.....	35 04
		24	8⅔	1,402	5,299	180	1,512	.....	47 92
2	Sultana	(Same as No. 1)							
3	Beulah Clay 4	7	.....	138	407	93	330	.....	23 15
		12	2	403	1,307	263	330	.....	29 09
		22	5½	1,450	6,447	263	330	.....	41 23
4	Ormsby B. Clay	6	.....	138	420	93	200	1,512	18 60
		12	2½	403	1,270	263	200	1,512	25 00
		24	8	1,450	5,930	263	200	1,512	38 75
5	La Belle Denise	5¼	.....	138	420	93	300	1,512	12 90
		12	2½	398	1,270	263	300	1,512	19 27
		24	8	1,390	5,215	263	300	1,512	32 32
6	Inoquette	(Same as No. 5)							
7	Denty 3 Queen	6	.....	160	470	118	300	1,512	10 90
		12	5½	160	470	118	300	1,512	16 40
		24	11	1,152	4,254	118	300	1,512	29 13
8	Flavia 5	(Same as No. 7)							
9	Annie L. A	(Same as No. 7)							
10	Soncy 5th	6	2	90	125	210	450	1,680	14 11
		12	4½	426	2,428	394	450	1,680	22 33
11	Diamond A	(Same as No. 10)							
12	Operatrice 2	6	4	80	100	90	500	1,680	16 49
		12	4	792	2,592	446	500	1,680	25 88
13	Bessie Bos 2nd	(Same as No. 12)							
14	O. Kate 3rd	6	.....	300	540	.....	1,870	336	39 12
		12	1	934	2,570	326	1,870	336	48 42
15	Denty 4 Pr	(Same as No. 14)							
16	Ottawa Boutsje	6	.....	205	542	162	155	1,150	12 20
17	Nancy A	(Same as No. 16)							
18	O. March 3	6	.....	80	260	140	360	560	10 59
19	O. B. Clay 2nd	(Same as No. 18)							
20	Flavia 2 B	(Same as No. 19)							

MISCELLANEOUS EXPERIMENTS.

A number of miscellaneous experiments with dairy utensils and the like were conducted during the past year, the results of which were insufficiently complete to warrant definite conclusions thereon.

One experiment, however, in the testing of various repellents for flies, was given considerable attention during the summer months. For this purpose a number of fly repellents commonly found on our markets were used. The results of these trials are as follows:—

(1) *La-Lo fly spray.*—This product, tested for the second year, showed quite variable results. Although a heavy oil with a very pleasant odour which does not taint the milk, yet this spray is not as effective as some of the others. It does not stain the animals' coats or the stalls and stanchions but, if applied in too great quantity or too frequently, blisters the skin very badly.

(2) *Dr. Williams' fly repellent.*—This also was a duplicate trial. This spray is very efficient in keeping off flies, but stains the coats of the animals very badly. More than that, if this spray happens to come in contact with painted woodwork, it is impossible to wash it off with ordinary soap and water. However, the efficiency of the spray as a fly repellent is outstanding, and in the results on this Farm this product may be taken as a standard of excellence. Care, however, must be taken with this or other products of a similar sort to prevent the odour getting in the milk and also precautions taken against too heavy applications, as it is apt to blister.

(3) *Creonoid.*—This also proved very efficient, was nearly as good as Dr. Williams' as a fly repellent, and did not stain the hide quite as much. Here again precautions were necessary against contaminating the milk or using in too great quantities and blistering the skin.

(4) *Pratt fly chaser.*—This repellent was nearly as good as Dr. Williams' spray as a fly repellent and did not stain quite as much as either Dr. Williams' or Creonoid. With this spray again precautions were necessary against a too heavy application, which would blister the skin. The odour of this spray also might contaminate the milk if the spraying was done immediately before milking.

It is interesting to note that not only were all these sprays, particularly the last three, fairly efficient in repelling the ordinary cattle fly during the summer months, but there is almost a complete absence of warble on the cattle where these sprays were used, whereas in the case of dry cows and heifers in nearby pastures, unsprayed throughout the summer, the number of warbles per animal is very high. Generally speaking, any good fly spray properly applied at the right time will save a large amount of money in the greater quantity of milk produced, the increased comfort of the animals, and, in the case of beef animals, the improved quality of flesh and hide.

CURES AND PREVENTIVES FOR ABORTION.

During the past two years a large number of experiments of this description have been made. Nearly all the cures commonly advertised and sold in America as well as carbolic acid and methylene blue have been used over a large number of cows. As soon as the present series of tests is completed these data will be available. All materials used to date have not shown beneficial results aside from their tendency to disinfect the vagina and uterus.

OTTAWA.,

MILKING MACHINES.

This most important line of experimental work has been given increased attention during the past year. Readers are referred to the last three annual reports for the results of previous years' trials with the first two machines installed namely, the Sharples and the Burrell-Lawrence-Kennedy. To meet the tremendous number of inquiries as to the adaptability of the milking machine to suit the farmer's needs, a brief summary was made giving an epitome of the more recent trials. This summary was written by Mr. G. W. Muir, who, under the supervision of the Dominion Animal Husbandman, is in charge of the milking machine experiments.

TRIALS.

Milking machines have been on trial at the Central Experimental Farm, Ottawa, for some years, the Sharples being installed in July, 1912, and the Burrell-Lawrence-Kennedy in September, 1913. In May, 1915, the Lister and Empire, and in July, 1915, the Omega, were added. These machines were selected as the most advanced types on sale and in operation in Canada, and they have all been given trials of varying duration.

The addresses of the manufacturers or agents handling these machines may be had from the pages of the Canadian farm journals.

TYPES.

The machines installed comprise two types: (*a*) that applying suction and pulsation to the teat, as represented in the B-L-K; and (*b*) those applying suction, pulsation and squeeze to the teat, as represented in the other makes. The chief difference is that one type (*a*) has no rubber lining to the teat cup, while those of type (*b*) have a rubber lining. Type (*a*) is on that account considered more sanitary, but it will not draw the milk so quickly. Type (*b*) on the other hand is a more rapid milker, as the slight massaging given the teat by the pressure seems to accelerate the milk flow, but the additional rubber has a tendency to less sanitary conditions and is more expensive in maintenance.

DESCRIPTIONS.

The Sharples machine is a one-cow milker, using suction and squeeze on the teat, the squeeze being applied by compressed air transmitted from the pump by an extra line of piping. The pulsator is attached to the pipe lines over the cows. This may be an advantage in that it is less liable to be damaged by the cows, but it is liable to stick in a cold stable during the winter months. The teat cup is rubber lined, rather complicated, difficult to assemble, and subject to corrosion by the action of disinfecting solutions used. The teat cup is practically universal, fitting all types of teats.

The Burrell-Lawrence-Kennedy machine is both a one- and two-cow milker, the latter having a division in the pail to allow the weighing of each cow's milk separately. This is an important feature, for every farmer should weigh the milk from his cows. The pulsator is placed on the can cover and is simple and durable. The teat cups are of metal, conical in shape, with a rubber mouth-piece and disc which surrounds the teat. The latter is the only rubber part which calls for frequent replacing and it is comparatively cheap. This teat cup is not as universal as some of the other types herein described.

The Lister machine is also a one- or two-cow milker, but the latter has no division in the pail. The pulsator is placed on the can cover, but can be detached at washing time. It is very efficient. The teat cups are of rather rough finished metal with rubber lining. They are heavy and clumsy and the rubber is not of the best quality. The teat cups are only fairly universal, as they will not remain on slim or

very short teats. This is partly due to their excessive weight and partly to their shape. The main objections to the machine are its clumsiness, roughness of construction, and its inability to remain on small teats.

The Empire machine is another one- or two-cow milker with no division in the can of the latter. The pulsator is placed on the can cover and is very simple and efficient, there being no springs to wear out. The teat cups are of metal, rubber lined, simple of construction, of good quality, and light. For a combination of efficiency, simplicity, durability, and lightness this machine is difficult to excel.

The Omega machine differs from the others in that it hangs from the cow's back by means of a broad strap instead of sitting on the floor. It consists of a can with pulsator attached, metal teat cups with rubber lining and rigid celluloid in place of rubber milk tubes. This arrangement keeps the teat cups from falling to the floor should they become detached from the cow's teats. This fact together with improvement acknowledged in the celluloid milk tubes is in favour of the machine from a sanitary point of view, but this advantage is largely overcome by the awkwardness of the machine and by the fact that time is lost in adjusting the teat cups and through the pulsator being attached directly to the can instead of to the lid or pipe line, making it impossible to change cans as is done with the other machines.

Except in the case of the Sharples, the style of vacuum pump used by the various machines is practically the same and is of minor importance except as it affects the initial cost of the outfit. The Sharples pump is double acting, *i.e.*, both vacuum and compression.

COST OF INSTALLATION.

Upon this factor depends largely the ultimate rise or fall of the milking machine. At the present time the cost of installation is prohibitive to many farmers who would otherwise use them, and until it is lowered considerably only the larger dairies will be in a position to install an outfit. On account of the high cost of the equipment, *i.e.*, power, pump, piping, etc., it is not profitable to install the same unless three or four single units or two or more double units are to be used. Additional units can be added and operated by the same power as that used for the smaller number. The following gives the list price of the various items, from which can be calculated the approximate cost of an outfit figuring on four single units or two double units for twenty cows and an additional single unit for every other ten cows.

Name of Machine.	Pumps, tanks, and fittings.	Single Milking unit.	Double milking unit.
	$	$	$
Sharples	88 00	120 00	....
B-L-K	139 50	85 00	117 00
Lister	135 00	110 00	150 00
Empire	110 00	110 00	135 00
Omega	115 00	100 00	....

A single unit includes one can, one pulsator, and attachments to milk one cow. A double unit includes one can, one pulsator, and attachments to milk two cows at once.

Stall piping is extra and would cost approximately 20 cents per foot for the Sharples machine and 15 cents per foot for the other makes. The power necessary to operate these machines would be approximately the same in all cases, and could be supplied by means of a 2-horse-power electric motor or gasolene engine.

COMPARATIVE EFFICIENCY.

Taking good hand milking as representing 100 per cent thoroughness in milking clean, the following figures were deduced from the data obtained during the trials of

the respective machines. They represent an average of two trials each for the Lister, Empire, and Omega, four trials for the Sharples, and five for the B-L-K.

	Per cent Efficiency.
Empire	91·59
Sharples	90·84
B-L-K	90·68
Omega	88·20
Lister	87·46

These figures serve to show the relative values of the different machines as found by experimental work. The difference between the Sharples and the B-L-K in efficiency is slight, but the B-L-K has the advantage in being much the cheaper machine. The above data also serve to show that in all cases it has been advisable and necessary to strip the cows. While some cows would give no strippings, others would give one-half to 2 pounds per day, which it would be inadvisable to leave on them. Heifers milked with machines from the start of their first milking gave little hand stripping and greater efficiency of all machines.

CHOICE OF MACHINE.

It must be remembered that in this experimental work the chances for error are great, for besides the influence of the machine on the cows, there is the influence of change of food, change of climatic conditions, unusual excitement due to numerous visitors, and many other factors not within the operator's or investigator's control and for which it is well-nigh impossible to make allowance one way or another. Nevertheless, the standing arrived at by the efficiency test coincides with the judgment passed upon the machine by all those who had anything to do with the same during the test. As this standing also coincides very well with the cost of installation data given previously, there should not be much doubt in the prospective buyer's mind as to the machine to purchase. In a commercial dairy the question of single *versus* double units is worthy of consideration for the latter are considerably cheaper, milk equally if not more quickly than two single units, and there is the advantage of having only half the number of pulsators to keep in order.

WHEN TO INSTALL.

Profitable installation would depend to a large extent on the conditions of labour and the size of the herd on the particular dairy farm where it is proposed to install a machine. It is safe to say that under any circumstances, twenty to twenty-five cows milking the year round would be the smallest number with which it would be profitable to install an outfit. If with this number of cows help had to be kept for other purposes it would become a doubtful proposition. Where sixty to seventy cows are kept, however, it would be profitable even though help had to be kept for other lines of work. In other words, the most profitable installation is the one which does the most work, saving the most manual labour for the capital involved. Success depends to a very large extent upon the operator. He must be quiet, quick, with an eye for details, and always at his post. Certainly he must have more intelligence than the average farm labourer.

QUALITY OF MILK.

It is possible to produce a very high quality of milk with any or all of these machines, but the farmer must be prepared to equip his dairy thoroughly and to wash and sterilize the machine in a proper manner. Unless this is done, the quality of the milk will fall below that of average hand milking, for a poorly handled and roughly washed machine provides a breeding place for bacteria. Just here it might be well to mention that some of the time saved in milking the cows is later lost when washing the machine, if it is washed properly.

OTTAWA.

FUTURE WORK.

Recently another mechanical milker has been added to the above-mentioned machines on experiment. This milker is the Calf-way milking machine. The results of this machine, together with a comparison with the above-mentioned milkers, will be reported on at a future date. On comparative trials of these machines with each other and with good hand milking, the efficiency in milking quickly and in a cleanly manner, the influence on the purity of the milk, and the durability, cheapness of upkeep and pathological effects of each of these machines on the cows are being studied most closely. It is hoped that the results of all these various trials may be completed during the coming fiscal year, when all the work will be properly summarized and left in the hands of Canadian dairy farmers. Undoubtedly this line of investigation has a most important bearing on Canadian dairying at the present time, when farm labour is so exceedingly scarce and expensive.

DAIRY HERD RECORDS.

Following are the dairy cow milk records for all the cows and heifers which have finished a lactation period during the fiscal year ending March 31, 1916. The fact that a number of cows in each of the herds have not at this date finished their lactation period would preclude the possibility of drawing definite comparisons between breeds from the following figures.

In the case of heifers with their first calves, charges for feed include the consumption from a date two months previous to parturition to the time of being dried off preparatory to their second calving. In the case of heifers and cows 3 years old and over, charges for feed include the period in which they were dry previous to the lactation period herein reported.

In estimating the cost of feeds, the following values were used:—

Pasture, per month	per cow.	$ 1 00
Meal mixture	"	25 00
Hay	"	7 00
Straw	"	4 00
Roots and ensilage	"	2 00
Green feed	"	3 00

These valuations represent fairly well the cost of raising these products, as contained in the report of the Field Husbandry Division for the Central Experimental Farm.

In calculating the value of products, 30 cents per pound is allowed for butter and 20 cents per hundred pounds for skim-milk and buttermilk. In reality, the price of butter ranged from 30 to 35 cents per pound; cream cheese sold realized over $3 per hundred pounds of milk; and coulommier cheese sold realized from $2.20 to $3 per hundred pounds of milk.

However, the above figures chosen for calculation were regular market values and form a basis for comparison of the various individuals in the herd with each other, for this and previous fiscal years, as well as with individuals of other herds on the branch Farms and Stations or on the farms of private individual farmers.

In computing these returns it will be noted that the bedding and labour in connection with the caring for cattle and also the manufacture of butter, cost of handling milk, and the like, have not been accounted for. On the other hand, the value of the manure made and the value of the calves at birth will more than counterbalance the above-mentioned items, although not sufficiently to overcome the interest and depreciation of the buildings and cattle. However, the following statements are used as a general basis for calculating the returns from the cattle, and the other items may be added by any farmer as they may be required.

Although the following list represents the cows which have finished a lactation period during the year, yet it does not by any means represent the total number of cows which have been milked during the past fiscal year, as many have failed to finish their lactation period.

OTTAWA.

Name and Breeds of Cows.	Age at beginning of Lactation Period.	Date of Dropping Calf.	Number of days in Lactation period.	Total pounds of Milk for period.	Daily average Yield of Milk.	Average per cent Fat in Milk.	Pounds of Butter produced in Period.	Value of Butter at 30c. per pound.
			Days.	Lb.	Lb.	Lb.	p.c.	$ cts.
Jennie of Parkdale.....G.H	7	Dec. 23, 1914...	400	13,993	34·9	4·00	600·09	198 03
Ottawa Itchen.....G	9	Dec. 31, 1914...	343	9,124	26·6	5·50	591·37	177 41
Brampton Blue Duchess.....J	5	Feb. 7, 1915...	266	8,825	33·1	5·47	567·95	170 38
Fortune 4th of Ottawa .....F.C.	7	June 30, 1914...	488	12,734	26·0	4·31	646·83	194 05
Brampton Rosa Bonheur.....J.	5	Oct. 2, 1914...	328	9,250	28·2	5·09	554·03	166 20
Ottawa Kate.....A	7	May 2, 1914...	370	12,797	34·6	3·90	587·50	176 25
Brampton Sultana Tena.....J.	5	Sept. 17, 1914...	340	8,569	25·2	4·93	497·17	149 15
Ottawa Deanie.....G	5	Jan. 3, 1915...	335	7,117	21·2	5·65	472·90	141 87
Ottawa Kate 2nd .....A.	5	Jan. 19, 1915...	376	11,011	29·3	4·21	546·50	163 95
Bessie Bos de Kol.....H.	5	April 14, 1915...	241	10,522	43·6	3·61	447·03	134 11
Canaan Beauty 2nd.....H.	2	Oct. 12, 1914...	425	13,602	32·0	3·22	516·14	154 84
May Echo Posch.....H.	2	Feb. 11, 1915...	275	11,863	43·1	3·21	448·65	134 59
Flora .....G. A.	6	Feb. 1, 1914...	489	11,104	22·7	4·18	546·17	163 85
Itchen's Girl.....G.	5	Nov. 2, 1914...	314	6,941	22·1	5·46	446·08	133 82
Maggie.....G. H.	5	Feb. 10, 1914...	450	12,134	26·9	3·67	524·65	157 39
Aromaz .....F. C.	6	May 20, 1914...	369	8,477	22·9	4·75	474·34	142 30
Pearl .....G. H.	9	Oct. 20, 1914..	380	10,736	28·2	3·78	477·80	143 34
Mainstay Girl.....G.	3	Nov. 5, 1914.	396	6,944	17·5	5·47	447·02	134 10
Arthur's Rose .....G. H.	8	Mar. 29, 1915...	341	9,889	29·0	3·94	458·71	137 61
Bell .....G. H.	3	Jan. 1, 1914.	421	12,357	29·3	3·46	504·19	151 26
Daisy.....G. A	6	Feb. 19, 1915.	342	9,973	29·1	3·92	462·08	138 62
Molly.....G. H.	4	Feb. 20, 1914...	437	10,771	24·6	3·99	505·95	151 78
Ruby's Pride.....G.	5	Feb. 7, 1915..	256	5,951	23·2	5·68	398·14	119 44
Maud .....G. A.	7	Nov. 14, 1914..	334	6,760	20·2	4·98	396·10	118 83
Beulah Clay 3rd.....H.	3	Aug. 15, 1914 ..	328	11,588	35·3	3·31	452·02	135 60
Betty.....G. A.	9	April 29, 1915..	329	8,984	27·3	3·86	408·34	122 50
Rhoda 2nd's Maud.....H.	8	May 29, 1914.	337	12,232	36·3	3·29	474·78	142 43
Arthur's Princess.....G. H	6	Aug. 4, 1914..	317	9,847	31·0	3·67	425·34	127 60
Evergreen March 3rd.....H.	4	June 20, 1914. .	347	11,281	32·5	3·43	456·09	136 82
PietertjeBurke .....H.	2	Mar. 5, 1915..	204	8,239	40·4	3·45	335·26	100 58
Rhoda Korndyke Queen.....H.	2	Oct. 2, 1914..	315	9,088	28·8	3·57	382·35	114 70
Itchen's Mainstay Queen.....G.	2	Sept. 20, 1914...	358	5,704	15·9	5·77	387·58	116 27
Beauty of Riverside.....A.	2	Mar. 4, 1915. .	302	5,814	19·2	5·10	349·07	104 72
Elegante Poupée.....F. C.	4	June 27, 1914..	331	7,082	21·4	4·69	391·31	117 39
Operatrice.....F. C.	6	Mar. 24, 1915...	291	7,051	24·2	4·27	354·79	106 43
Denty 3rd of Ottawa.....A	9	Nov. 12, 1914.	293	6,958	23·7	4·17	341·95	102 58
Pearly's Maid .....G.	5	Mar. 28, 1915..	256	5,272	20·6	5·22	323·85	97 15
Flavia 2nd of Ottawa.....A.	8	May 10, 1914.	356	10,004	28·1	3·66	431·78	129 53
Tannahill's Diamond.....G. H	7	Mar. 9, 1015.	344	9,609	28·0	3·45	390·51	117 15
Ottawa Raleigh Cora.....J.	2	Jan. 25, 1915..	278	4,446	16·0	5·87	307·20	92 16
Denty 4th of Ottawa.....A.	8	May 9, 1914.	344	8,764	25·4	3·87	399·98	119 99
Denty 4th of Ottawa.....A.	9	June 19, 1915.	225	5,211	23·1	4·77	292·46	87 74
Jessie F.....A.	2	Sept. 5, 1914.	330	7,500	22·7	3·50	313·44	94 03
Surprise 2nd.....G. H.	2	Aug. 14, 1914.	411	7,067	17·2	3·99	331·82	99 55
Marjorie 6th of Ottawa .....A.	5	Feb. 6, 1915..	297	5,716	19·2	4·24	285·69	85 71
Brampton Noble's Lady.....J.	2	May 12, 1914..	411	5,225	12·7	5·28	336·65	100 99
Soney 4th of Ottawa.....A.	2	Feb. 23, 1915...	318	5,495	17·2	4·45	290·50	87 15
LaBelle 2nd.....F. C.	2	Sept. 17, 1914..	331	5,212	15·7	4·64	284·76	85 43
Archer's Pearl .....G.	6	Nov. 17, 1914..	278	4,312	15·5	5·46	277·41	83 22
Queen Flavia .....A.	2	Nov. 21, 1914...	327	5,723	17·5	4·33	291·99	87 60
Itchen's Pride.....G.	5	Aug. 15, 1914...	277	5,096	18·4	4·52	270·97	81 29
Lady Anne 2nd .....G. A.	5	April 1, 1914...	364	6,755	18·5	3·80	302·30	90 69
Brampton Stockwell's Girl.....J.	3	May 17, 1915...	319	3,942	12·3	5·52	256·43	76 93
Nancy 2nd .....G. A.	5	April 27, 1914...	367	7,466	20·3	3·48	306·17	91 85
De Clairvaux.....F. C.	3	Sept. 21, 1914...	303	5,115	16·8	3·66	220·56	66 16
Kirsty 2nd.....G. A.	5	May 15, 1914..	318	5,137	16·1	3·83	231·94	69 58
Inoquette.....F. C.	11	Sept. 7, 1914...	331	3,658	11·0	4·57	196·95	59 08
Dixie 2nd.....G. A.	7	June 24, 1914...	337	5,662	16·8	3·84	253·44	76 03

Value of skim-milk at 20c. per cwt.	Total Value of product.	Amount of meal eaten at 1½c. per pound.	Amount of roots and ensilage eaten at $2 per ton.	Amount of hay eaten at $7 per ton.	Amount of green feed eaten at $3 per ton.	Amount of straw eaten at 20c. per cwt.	Months on pasture at $1 per month.	Total cost of feed between calvings.	Cost to produce 100 pounds of milk.	Cost to produce 1 lb. butter (skim-milk neglected).	Profit on 1 lb butter (skim-milk neglected).	Profit on cow between calvings (labor and calf neglected).
$ cts.	$ cts.	Lb.	Lb.	Lb.	Lb.	Lb.	Mos.	$ cts.	cts.	cts.	cts.	$ cts.
26 86	224 89	4,218	14,565	2,616	1,470	63	....	78 77	56·2	11·9	18·1	146 12
17 24	194 65	3,248	8,037	1,648	2,930	302	1	60 40	66·2	10·2	19·8	134 25
16 68	187 06	2,978	6,935	1,420	2,930	302	1	55 13	62·4	9·7	20·3	131 93
24 37	218 42	4,820	9,362	2,170	6,632	424	2	89 98	70·6	13·9	16·1	128 44
17 56	183 76	3,062	7,837	1,788	2,930	424	1	58 61	63·3	10·5	19·5	125 15
24 59	200 84	5,196	6,200	3,066	4,000	346	1	89 57	69·9	15·2	14·8	111 27
16 29	165 44	3,086	7,817	1,788	2,930	424	1	58 88	68·7	11·8	18·2	106 56
13 43	155 30	2,566	8,087	1,648	2,930	302	1	49 93	70·1	10·5	19·5	105 87
21 09	175 04	3,751	9,837	1,972	2,930	302	1	69 62	63·2	12·7	17·3	105 42
20 28	154 39	3,036	5,930	1,060	2,930	.....	1	52 98	50·3	11·8	18·2	101 41
26 33	181 17	4,400	11,660	2,132	2,930	364	1	80 25	59·0	15·5	14·5	100 92
22 96	157 55	3,315	6,142	1,160	2,930	.....	1	57 03	48,0	12·7	17·3	100 52
21 27	185 12	4,709	12,395	2,638	3,700	....	2	88 02	79·2	16·1	13·9	97 10
13 12	146 94	2,494	7,372	1,532	2,930	424	1	50 15	72·2	11·2	18·8	96 79
23 37	180 76	4,502	15,355	2,520	3,700	.....	.....	85 99	70·8	16·3	13·7	94 77
16 12	158 42	3,384	7,355	2,172	3,760	424	1	64 64	76·2	13·6	16·4	93 78
20 66	164 00	4,001	9,385	2,436	1,470	62	.....	70 25	65·3	14·7	15·3	93 75
13 12	146 22	2,771	8,457	1,828	2,930	364	1	55 72	80·2	12·4	17·6	90 50
19 00	156 61	3,620	2,535	2,256	1,470	.....	.....	67 70	68·4	14·7	15·3	88 91
23 85	175 11	4,610	14,695	2,388	3,700	.....	.....	86 22	69·7	17·1	12·9	88 89
19 16	157 78	3,754	12,225	2,436	1,470	.....	.....	69 88	70·0	15·1	14·9	87 90
20 68	172 46	4,474	14,335	2,520	3,700	.....	½	85 12	70·0	16·8	13·2	87 34
11 22	130 66	2,218	7,027	1,420	2,930	302	1	45 72	76·8	11·4	18·6	84 94
12 85	131 68	2,432	8,815	1,878	1,470	.....	.....	47 99	71·0	12·1	17·9	83 69
22 40	158 00	4,134	8,480	1,716	4,620	364	1	74 80	64·5	16·5	13·5	83 20
17 27	139 77	3,012	11,925	2,256	1,470	.....	.....	59 68	66·4	14·6	15·4	80 09
23 65	166 08	4,978	7,380	2,504	4,000	364	1	86 08	70·3	18·1	11·9	80 00
18 97	146 57	3,828	10,465	2,078	3,700	.....	.....	71 13	72·2	16·7	13·3	75 44
21 78	158 60	4,784	8,000	2,654	3,000	364	1	83 32	73·9	18·2	11·8	75 28
15 91	116 49	2,396	3,692	634	2,930	.....	1	41 25	50·0	12·3	17·7	75 24
17 52	132 22	3,084	8,192	1,458	2,930	364	1	57 96	63·7	15·2	14·8	74 26
10 74	127 01	2,583	8,002	1,840	2,932	424	1	52 97	92·8	13·6	16·4	74 04
11 03	115 75	2,104	6,162	1,232	2,930	118	1	42 40	72·9	12·1	17·9	73 35
13 49	130 88	2,956	7,045	1,800	3,700	424	1	57 68	81·4	14·7	15·3	73 20
13 49	119 92	2,460	8,037	1,600	2,930	178	1	50 14	71·1	14·1	15·9	69 78
13 33	115 91	2,556	5,757	1,472	2,930	272	1	48 78	70·1	14·2	15·8	67 13
9 99	107 14	2,032	5,597	1,108	2,930	122	1	40 64	77·0	12·5	17·5	66 50
19 27	148 80	4,588	6,590	3,338	4,000	334	1	83 28	83·2	19·2	10·8	65 52
18 55	135 71	3,780	13,655	2,424	1,470	.....	.....	71 09	73·9	18·2	11·8	64 62
8 37	100 53	1,827	5,302	1,234	2,930	162	1	38 18	85·8	12·4	17·6	62 35
16 84	136 83	3,936	6,740	3,210	4,000	334	1	74 84	85·4	18·7	11·3	61 99
9 92	97 65	1,902	5,477	1,054	2,330	.....	1·3	37 77	72·5	12·9	17·1	59 88
14 46	108 49	2,512	7,402	1,886	2,650	334	1	51 03	68·0	16·2	13·8	57 46
13 97	113 52	2,603	12,435	2,238	2,970	.....	..	57 26	81·0	17·2	12·8	56 26
10 86	96 57	2,145	5,837	1,190	2,930	166	1	42 54	74·4	14·9	15·1	54 03
9 87	110 86	2,706	7,105	1,966	4,800	424	2	57 84	110·6	17·1	12·9	53 02
10 50	97 65	2,104	7,842	1,544	2,930	162	1	45 26	82·3	15·5	14·5	52 39
9 94	95 37	1,955	7,377	1,558	2,930	424	1	43 51	83·4	15·3	14·7	51 86
8 15	91 37	1,718	7,207	1,488	2,930	424	1	40 13	93·0	14·4	15·6	51 24
10 95	98 55	2,380	8,769	2,064	1,920	362	1	50 34	88·0	17·2	12·8	48 21
9 73	91 02	2,148	7,075	1,716	2,600	424	1	45 66	89·6	16·8	13·2	45 36
13 00	103 69	2,895	7,600	2,576	3,700	.....	.....	58 36	86·3	19·3	10·7	45 33
7 45	84 38	1,776	7,697	1,524	2,930	.....	1	40 63	103·0	15·8	14·2	43 75
14 41	106 26	3,654	8,070	2,856	3,700	.....	...	69 29	92·8	22·6	7·4	36 97
9 85	76 01	2,026	7,357	1,716	2,150	424	1	43 73	85·4	19·8	10·2	32 28
9 87	79 45	2,482	9,740	2,088	3,700	.....	....	53 62	104·3	23·1	6·9	25 83
6 98	66 06	1,709	7,342	1,526	5,830	424	1	44 64	122·3	22·6	7·4	21 42
10 89	86 92	3,562	8,640	3,358	3,700	.....	.....	70 47	124·4	27·8	2·2	16·45

GRADE AYRSHIRES.

Name of Cow.	Age at beginning of Lactation Period.	Date of Dropping Calf.	Number of days in Lactation Period.	Total pounds of Milk for Period.	Daily average Yield of Milk.	Average per cent of Fat in Milk.	Pounds of Butter produced in Period.	Value of Butter at 30c per pound.
				Lb.	Lb.	Lb.	Lb.	$ cts.
Flora	6	Feb. 1, 1914	489	11,104	22·7	4·18	546·17	163 85
Daisy	6	Feb. 19, 1915	342	9,973	29·1	3·92	462·08	138 62
Maud	7	Nov. 14, 1914	334	6,760	20·2	4·98	396·10	118 83
Betty	9	April 29, 1915	329	8,984	27·3	3·86	408·34	122 50
Lady Anne 2nd	5	April 1, 1914	364	6,755	18·5	3·80	302·30	90 69
Average, 5 best	7		371	8,715	23·6	4·15	423·00	126 90
Average, total herd 8 head	6		360	7,730	21·5	4·00	363·32	108 99

GRADE HOLSTEIN.

Jennie of Parkdale	7	Dec. 23, 1914	400	13,993	34·9	4·00	660·09	198 03
Maggie	5	Feb. 10, 1914	450	12,134	26·9	3·67	524·65	157 39
Pearl	9	Oct. 20, 1914	380	10,736	28·2	3·78	477·80	143 34
Arthur's Rose	8	Mar. 29, 1915	341	9,889	29·0	3·94	458·71	137 61
Bell	3	Jan. 1, 1914	421	12,357	29·3	3·46	504·19	151 26
Average, 5 best	6		398	11,822	29·7	3·77	525·09	157 53
Average, total herd 9 head	6		389	10,711	27·5	3·77	475·45	142 63

AYRSHIRE.

Ottawa Kate	7	May 2, 1914	370	12,797	34·6	3·90	587·50	176 25
Ottawa Kate 2nd	5	Jan. 19, 1915	376	11,011	29·3	4·21	546·50	163 95
Beauty of Riverside	2	Mar. 4, 1915	302	5,814	19·2	5·10	349·07	104 72
Denty 3rd of Ottawa	9	Nov. 12, 1914	293	6,958	23·7	4·17	341·95	102 58
Flavia 2nd of Ottawa	8	May. 10, 1914	356	10,004	28·1	3·66	431·78	129 53
Average, 5 best	7		339	9,317	27·0	4·21	451·36	135 41
Average, total herd 11 head	5		322	7,727	24·0	4·13	375·53	112 66

FRENCH-CANADIAN.

Fortune 4th of Ottawa	7	June 30, 1914	488	12,734	26·0	4·31	646·83	194 05
Aromaz	6	May 20, 1914	369	8,477	22·9	4·75	474·34	142 30
Elegante Poupée	4	June 27, 1914	331	7,082	21·4	4·69	391·31	117 39
Operatriee	6	Mar. 24, 1915	291	7,051	24·2	4·27	354·79	106 43
Labelle 2nd	2	Sept. 17, 1914	331	5,212	15·7	4·64	284·76	85 43
Average, 5 best	5		362	8,111	22·0	4·53	430·41	129 12
Average, total herd 7 head	5		349	7,047	20·2	4·42	367·08	102 78

GRADE AYRSHIRE

Value of Skim Milk at 20c. per cwt.	Total Value of Product.	Amount of Meal eaten, at 1½c. per pound.	Amount of Roots and Ensilage eaten, at $2 per ton.	Amount of Hay eaten, at $7 per ton.	Amount of Green Feed eaten, at $3 per ton.	Amount of Straw eaten, at 20c. per cwt.	Months on Pasture at $1 per month.	Total Cost of Feed between Calvings.	Cost to produce 100 pounds of Milk.	Cost to produce 1 pound Butter (skim milk neglected).	Profit on 1 pound Butter (skim milk neglected).	Profit on Cow between Calvings (labor and calf neglected).
$ cts.	$ cts.	Lb.	Lb.	Lb.	Lb.	Lb.	Mos.	$ cts.	cts.	cts.	cts.	$ cts.
21 27	185 12	4,709	12,395	2,638	3,700	.....	2	88 02	79·2	16·1	13·9	97 10
19 16	157 78	3,754	12,225	2,436	1,470	.....	.....	69·88	70·0	15·1	14·9	87 90
12 85	131 68	2,432	8,815	1,878	1,470	.....	.....	47 99	71·0	12·1	17·9	83 69
17 27	139 77	3,012	11,925	2,256	1,470	.....	.....	59 68	66·4	14·6	15·4	80 09
13 00	103 69	2,895	7,600	2,576	3,700	.....	.....	58 36	86·3	19·3	10·7	45 33
16 71	143 61	3,360	10,592	2,357	2,362	.....	.....	64 79	74·6	15·4	14·6	78 82
14 84	123 84	3,312	9,926	2,511	2,864	.....	.....	64 66	83·6	17·8	12·2	59 17

GRADE HOLSTEIN.

26 86	224 89	4,218	14,565	2,616	1,470	62	. .	78 77	56·2	11·9	18·1	146 12
23 57	180 76	4,502	15,353	2,520	3,700	.....	. .	85 99	70·8	16·3	13·7	94 77
20 66	164 00	4,001	9,385	2,436	1,470	62	. .	70 25	65·3	14·7	15·3	93 75
19 00	156 61	3,620	2,536	2,256	1,470	.....	.....	67 70	68·4	14·7	15·3	88 91
23 85	175 11	4,610	14,695	2,388	3,700	.....	. .	86 22	69·7	17·1	12·9	88 89
22 79	180 27	4,190	11,307	2,443	2,362	.....	. .	77 79	66·1	14·9	15·1	102 49
20 61	163 25	3,959	13,047	2,386	2,628	. .	. .	74 75	69·7	15·7	14·3	88 50

AYRSHIRE.

24 59	200 84	5,196	6,200	3,066	4,000	346	1	89 57	69·9	15·2	14·8	111 27
21 09	175 04	3,751	9,837	1,972	2,930	302	1	69 62	63·2	12·7	17·3	105 42
11 03	115 74	2,104	6,162	1,232	2,930	118	1	42 40	72·9	12·1	17·9	73 35
13 33	115 91	2,556	5,757	1,472	2,930	272	1	48 78	70·1	14·2	15·8	67 13
19 27	148 80	4,588	6,590	3,338	4,000	334	1	83 28	83·2	19·2	10·8	65 52
17 86	151 27	3,639	6,909	2,216	3,358	274	1	66 73	71·9	14·7	15·3	84 54
14 81	127 47	3,016	6,965	2,003	3,050	248	1	57 77	75·0	15·3	14·7	69 71

FRENCH-CANADIAN.

21 37	218 42	4,820	9,362	2,170	6,632	424	2	89 98	70·6	13·9	16·1	128 44
16 12	158 42	3,384	7,355	2,172	3,700	424	1	64 64	76·2	13·6	16·4	93 78
13 49	130 88	2,956	7,045	1,800	3,700	424	1	57 68	81·4	14·7	15·3	73 20
13 49	119 92	2,460	8,037	1,600	2,930	178	1	50 14	71·1	14·1	15·9	69 78
9 94	95 37	1,955	7,377	1,558	2,930	424	1	43 51	83·4	15·3	14·7	51 86
15 46	144 60	3,115	7,835	1,860	3,978	375	1·2	61 19	76·5	14·3	15·7	83 41
13 47	116 25	3,023	7,882	2,053	3,677	328	1	60 02	85·2	16·3	13·7	56 23

GUERNSEY.

Name of Cow.	Age at beginning of Lactation Period.	Date of Dropping Calf.	Number of days in Lactation Period.	Total pounds of Milk for Period.	Daily average Yield of Milk.	Average per cent Fat in Milk.	Pounds of Butter produced in Period.	Value of Butter at 30c. per pound.
				Lb.	Lb.	p.c.	Lb.	$ cts.
Ottawa Itchen	9	Dec. 31, 1914	343	9,124	26·6	5·50	591·37	177 11
Ottawa Deanie	5	Jan. 3, 1915	335	7,117	21·2	5·65	472·90	141 87
Itchen's Girl	5	Nov. 2, 1914	314	6,941	22·1	5·46	446·08	133 82
Mainstay Girl	3	Nov. 5, 1914	396	6,944	17·5	5·47	447·02	134 10
Ruby's Pride	5	Feb. 7, 1915	256	5,951	23·2	5·68	398·14	119 44
Average, 5 best	5		328	7,215	22·1	5·55	471·10	141 33
Average, total herd, 9 head	5		312	6,273	20·0	5·44	401·70	120 51

HOLSTEIN.

Bessie Bos de Kol	5	April 14, 1915	241	10,522	43·6	3·61	447·03	134 41
Canaan Beauty 2nd	2	Oct. 12, 1914	425	13,602	32·0	3·22	516·14	154 84
May Echo Posch	2	Feb. 11, 1915	275	11,863	43·1	3·21	448·65	134 59
Beulah Clay 3rd	3	Aug. 15, 1914	328	11,588	35·3	3·31	452·02	135 60
Rhoda 2nd's Maud	8	May 29, 1914	337	12,232	36·3	3·29	474·78	142 43
Average, 5 best	4		321	11,981	38·1	3·33	467·72	140 31
Average, total herd, 8 head	4		309	11,052	35·7	3·31	439·04	131 71

JERSEY.

Brampton Blue Duchess	5	Feb. 7, 1915	266	8,825	33·1	5·47	567·95	170 38
Brampton Rosa Bonheur	5	Oct. 2, 1914	328	9,250	28·2	5·09	554·03	166 20
Brampton Sultana Tena	5	Sept. 17, 1914	340	8,569	25·2	4·93	497·17	149 15
Ottawa Raleigh Cora	2	Jan. 25, 1915	278	4,446	16·0	5·87	307·20	92 16
Brampton Noble's Lady	2	May 12, 1914	411	5,225	12·7	5·28	336·65	100 99
Average, 5 best	4		325	7,263	23·0	5·33	452·60	135 78
Average, total herd, 6 head	4		324	6,709	20·7	5·32	419·90	125 97

GUERNSEY.

Value of Skim Milk at 20c. per cwt.	Total Value of Product.	Amount of Meal eaten, at 1½c. per pound.	Amount of Roots and Ensilage eaten at $2 per ton.	Amount of Hay eaten at $7 per ton.	Amount of Green Feed eaten at $3 per ton.	Amount of Straw eaten at 20c. per cwt.	Months on Pasture, at $1 per month.	Total Cost of Feed between Calvings.	Cost to Produce 100 pounds of Milk.	Cost to produce 1 pound Butter (skim milk neglected).	Profit on 1 pound Butter (skim milk neglected).	Profit on Cow between Calvings (labor and calf neglected).
$ cts.	$ cts.	Lb.	Lb.	Lb.	Lb.	Lb.	Mos.	$ cts.	cts.	cts.	cts.	$ cts.
17 24	194 65	3,248	8,037	1,648	2,930	302	1	60 40	66·2	10·2	19·8	134 25
13 43	155 30	2,566	8,087	1,648	2,930	302	1	49 93	70·1	10·5	19·5	105 87
13 12	146 94	2,494	7,372	1,532	2,930	424	1	50 15	72·2	11·2	18·8	96–79
13 12	146 22	2,771	8,457	1,828	2,930	364	1	55 72	80·2	12·4	17·6	90 50
11 22	130 66	2,218	7,027	1,420	2,930	302	1	45 72	76·8	11·4	18·6	84 94
13 63	154 75	2,659	7,796	1,615	2,930	339	1	52 38	73·1	11·1	18·9	102 47
11 86	132 37	2,419	7,429	1,581	2,893	343	1	49 03	78·1	12·2	17·8	83 34

HOLSTEIN.

20 28	154 39	3,036	5,930	1,060	2,930	.....	1	52 98	50·3	11·8	18·2	101 41
26 33	181 17	4,400	11,660	2,132	2,930	364	1	80 25	59·0	15·5	14·5	100·92
22 96	157 55	3,315	12,395	2,638	3,700	.....	1	57 03	48·0	12·7	17·3	100 52
22 40	158 00	4,134	8,480	1,716	4,620	364	1	74 80	64·5	16·5	13·5	83 20
23 65	166 08	4,978	7,380	2,504	4,000	364	1	86 08	70·3	18·1	11·9	80 00
23 12	163 44	3,973	9,169	2,010	3,636	.....	1	70 23	58·4	14·9	15·1	93 21
21 36	153 07	3,766	8,216	1,849	3,380	.....	1	66 71	60·4	15·1	14·9	86 36

JERSEY.

16 68	187 06	2,978	6,935	1,420	2,930	302	1	55 13	62·4	9·7	20·3	131 93
17 56	183 76	3,062	7,837	1,788	2,930	424	1	58 61	63·3	10·5	19·5	125 15
16 29	165 44	3,086	7,817	1,788	2,930	424	1	58 88	68·7	11·8	18·2	106 56
8 37	100 53	1,827	5,302	1,234	2,930	162	1	38 18	85·8	12·4	17·6	62 35
9 87	110 86	2,706	7,105	1,966	4,800	424	2	57 84	110·6	17·1	12·9	53 02
13 75	149 53	2,732	6,999	1,639	3,304	348	1·2	53 73	80·2	12·3	17·7	95 80
12 70	138 68	2,589	7,115	1,620	3,242	289	1·2	51 54	76·8	12·2	17·8	87 13

CANADIAN HOLSTEIN—Friesian Record of Merit.

Name of Cow, and Number of Cow.	Age at commencement of test.	Number of days in test.	Pounds milk produced.	Pounds fat produced.	Pounds 80 per cent butter produced.
Boutsje de Boer Posch (10341)	6y., 6m., 24d.	7	502·5	16·88	21·10
	6y., 6m., 24d.	30	2,102·5	68·61	85·77
Evergreen March 3rd (12659)	5y., 9m., 18d.	7	560·5	20·24	25·31
	5y., 9m., 18d.	14	1,118·0	39·19	48·99
Lady Jane of Burnbrae 2nd (9817)	7y., 6m., 8d.	7	525·5	16·86	21·08
	7y., 6m., 8d.	30	2,145·5	66·36	82·96
Rosa Bonheur Flower (24620)	3y., 2m., 22d.	7	519·0	15·20	19·01
	3y., 2m., 22d.	30	2,077·0	62·70	78·38
May Echo Posch (36024)	3y., 2m., 19d.	1	97·5	2·966	3·707
	3y., 2m., 15d.	7	671·5	20·34	25·437
	3y., 1m., 28d.	30	2,685·25	83·438	104·307
	3y., 1m., 7d.	60	4,909·25	158·014	197·517
	3y., 1m., 7d.	90	7,087·75	231·535	289·410
Canaan Beauty 2nd (21172)	3y., 8m., 20d.	1	93·5	2·622	3·277
	3y., 8m., 0d.	7	606·00	18·858	23·572
	3y., 7m., 26d.	30	2,622·00	77·972	97·452
	3y., 7m., 9d.	60	5,008·50	153·549	191·936
	3y., 7m., 1d.	90	7,145·00	220·019	275·020
Bessie Bos deKol (11880)	7y., 0m., 28d.	7	515·5	18·420	23·025
	7y., 0m., 28d.	14	1,012·0	35·433	44·291
	7y., 0m., 11d.	30	2,068·5	74·862	93·577

CANADIAN Record of Performance (April 1, 1915 to March 31, 1916.)

Name of Cow.	Breed.	Age at commencement of test.	Number of days milking.	Pounds of milk produced.	Pounds of fat produced.	Average per cent fat.
Bessie Bos deKol (11880)	Holstein	6	221	10,522	385	3·66
Beulah Clay 3rd (17034)	Holstein	3	328	11,584	383	3·30
Evergreen March 3rd (12659)	Holstein	5	347	11,284	393	3·48
May Echo Posch (36024)	Holstein	2	275	11,863	377	3·17
Denty 4th of Ottawa (25269)	Ayrshire	8	342	8,768	352	4·01
Ottawa Kate (29601)	Ayrshire	8	365	12,768	480	3·75
Elegante Poupée (2146)	Fr. Canadian	4	331	7,085	321	4·52
Brampton Rosa Bonheur (2519)	Jersey	5	328	9,198	484	5·26
Brampton Sultana Tena (2852)	Jersey	5	337	8,573	430	5·02

A BALANCE SHEET OF GRADE CATTLE.

FROM DATE OF PURCHASE, AUGUST 1912, TO DECEMBER 1, 1915.

The question has recently arisen as to whether the grade herd on this Farm is self-sustaining, aside from its value for the conducting of feeding experiments, experiments in milk production, and also grading experiments. The following statement, covering a period of over three years is of interest:—

To cost price of 23 Holsteins brought into the herd	$2,343 00	
" " 22 Ayrshires " " "	1,745 00	
" of all feed for cows and their calves	5,707 13	
To compound interest on investment to date	125 00	
By milk produced by all animals in herd, 676,092 pounds at $2 per cwt.	.....	$13,521 84
By animals sold from herd (reacters, non-producers, and male calves)	.....	1,125 00
By value of Holsteins on hand (including 12 cows, 9 heifers, and 8 steers)	.....	1,673 00
By value of Ayrshires on hand (including 6 cows, 7 heifers, and 3 steers)	.....	959 00
To profit balance	7,358 71	
	$17,278 84	$17,278 84

The value of calves on hand is exactly the cost price. This is a lower valuation than they would have commercially. The value of $2 per hundredweight on the milk is also very conservative, as during the first two years this milk sold at $3 per hundredweight.

The value of labour and manure are not credited on the two sides of this balance sheet, but will approximately counterbalance each other, and would certainly counterbalance each other, if this had been run purely as a commercial herd and certified milk not produced. However, since approximately ordinary milk prices have been credited, it is only fair to deduct proportionately the labour; hence this balance sheet is quite correct as a commercial proposition.

Since most of the milk sold at $3 per hundredweight, the actual sales of milk credited to this herd would amount to $20,282.76. This herd was housed in a separate barn and used for experiments both in the testing of feeds and the manufacturing of certified milk. The extra labour entailed amounted to nearly $1,800. Even including this heavy expenditure for labour, the above statement might be revised to show an actual profit of $12,318.63.

CO-OPERATIVE MILK RECORDS.

During the past year an increasing number of applications were received for milk and feed record forms—which are distributed free of charge upon application to this Division. This is a gratifying indication of the rapidly improving methods being adopted by the dairy farmers in keeping records for the individual cows of their herds. Apparently, however, there are still many farmers who are not aware of this free distribution of record forms. The following is a list of the forms for distribution:—

Month long.—Daily milk records suitable for herds numbering up to twenty-two cows.

Week long.—Daily milk records suitable for herds numbering up to sixteen cows.

Week long.—Daily milk records suitable for herds numbering up to twenty-four cows.

Monthly summary records.

Yearly summary records.

Feed record forms.

It should be clearly understood that the object of this free distribution is not in any way to overlap the work of the Cow Testing Associations of the Dairy and Cold Storage Branch, Department of Agriculture; but rather to encourage individual farmers, especially in districts where cow testing associations are not developed, so that these individuals may in turn eventually form the nuclei of record centres.

DISPOSAL OF MILK.

The milk produced on the Central Experimental Farm during the past year has been marketed almost wholly as butter, cream, and Coulommier cheeses, and cheddar cheese, and only a very limited quantity of milk and cream sold to the Farm employees who have not the facilities of city distribution. The production of "certified" milk has been temporarily discontinued owing to the lack of facilities in the dairy building for keeping down the bacterial count. Considering the large amount of experimental work with various cheeses, as well as the handsome revenue from this dairy, it is surely time that a modern and efficient dairy building be supplied. No farm dairy in Canada with an annual output amounting to over $10,000 is so ill supplied with room and sanitary quarters.

Owing to this lack of sufficient room, no new phases of experimental manufacturing or marketing have been tried. A continuation of trials in the curing of small cheddar cheese has of necessity been discontinued owing to the lack of proper cooling and curing rooms. However, the demands for the different makes of small cheese have continued to increase. Milk marketed in these various ways nets from $1.60 to $3 per hundred pounds. Further pamphlets on this question of the handling, manufacturing, and testing of dairy products have been published during the past year.

TESTING REFRIGERATOR MILK CANS.

The object of this test was the comparison of the ordinary single-jacket milk can with an insulated double-jacket can for the shipping of milk a distance in warm weather.

For this purpose an ordinary 10-gallon can was compared with a special 10-gallon insulated can manufactured by the Sturges & Burns Manufacturing Co., Chicago, Ill. This is a double-jacket can with felt insulation at top and cork insulation at sides and bottom between the metal jackets. The cover too has special felt insulation. These 10-gallon cans sell at $12 each at the manufacturers.

Methods of Test.—The milk was cooled by the use of the cooler and ice tanks and shipped by wagon to the Ottawa Dairy, Ottawa. The temperatures of each lot were recorded at the times specified in the following table:—

Date.	Temperature at Farm—6.00 a.m.	Temperature at city—8.30 a.m.	
		Ordinary can.	Insulated can.
	Degrees.	Degrees.	Degrees.
July 16	41	50	42
" 17	44	52	46
" 20	39	50	42
" 22	34	43	38
" 24	36	48	38
" 27	38	45	38
" 28	36	45	38
" 29	38	47	39
Average 8 days	38·2	47·4	40·1

OTTAWA.

It will be seen from the above statement that the insulated can is most efficient in maintaining a low temperature and, consequently, the keeping qualities of the milk. During very hot weather the milk increased in temperature during 2½ hours only 1·9° in the insulated can, while in the ordinary can the temperature increased over 9°. Applying this result to conditions where the milk or cream could not be cooled much below 48° before shipping and where it must travel for several hours in wagons or superheated express cars, one is safe in predicting an extensive use of these cans. Many cream shippers in Canada might well adopt them until refrigerator cars are provided.

PUBLICATIONS.

During the past year the Animal Husbandry Division, Central Experimental Farm, has published a large number of circulars relating to the feeding, care and management of dairy cattle, and the manufacturing, marketing, and testing of milk and milk products. These may be had upon application to this Division.

FINANCIAL STATEMENT FOR DAIRY CATTLE.

Below are submitted inventories and returns for dairy cattle on the Central Experimental Farm for the year April 1, 1915, to March 31, 1916.

	April 1, 1915.		March 31, 1916.		Returns including sales of dairy produce, breeding cattle, and bull service.	Gross returns including increased values and sales.
	No.	Value.	No.	Value.		
		$		$	$	$
Dairy cattle	159	27,570 00	166	28,305 00	15,640 46	16,375 46

Returns.

By increased value of herds	$ 735 00	
Returns from dairy products	10,189 11	
Returns from sales of cattle	4,087 35	
Returns from bull service	53 00	
Returns from manure, 1,311 tons at $1	1,311 00	
Gross returns		$ 16,375 46

Expenditures.

To value of foodstuffs consumed	$ 8,648 45	
Cost of labour	6,919 77	
Cost of new stock purchased	3,403 50	
Gross expenditures		$ 18,971 72
Net debit balance from dairy cattle		$ 2,596 26

N.B. 1.—Item "Increased value of herds" small, due to heavy depreciation in value of aged cows and three losses, which totalled $1,430.

N.B. 2.—This statement includes extra labour and supplies for special experimental work, amounting to $3,100, which rightly should not be charged against the herd.

OTTAWA.

EXPERIMENTAL STATION, CHARLOTTETOWN, P.E.I.

REPORT OF THE SUPERINTENDENT, J. A. CLARK, B.S.A.

DAIRY CATTLE.

Three Ayrshire cows were purchased during the year. "Island Queen of Spruce Row" dropped dead in her stall on June 9. She seemed all right at the morning milking and ate her morning feed up clean. The veterinary was unable to locate any cause of death.

Dry timothy hay from the top of a mow put both of the cows off their feed for a time in November. Up to that time the ration fed contained rather too much coarse feed. The ration was then changed to foods richer in protein and the bulk of rough feeds cut down. The cows soon regained their flow of milk and did well the rest of the season. The rations are here given:

RATION Fed to Dairy Cows at Charlottetown up to November 18, 1915.

Feed.	—	Dry Matter.	Digestible Nutrients.			Nutritive ratio.
			Protein.	Carbohydrates.	Fat.	
	Lb.	Lb.				
Turnips	50	5·7	0·50	4·075		
Mixed hay	16	13·71	0·768	6·739		
Oats	4	3·56	0·368	2·316		
Bran	5	4·4	0·61	2·275		
	75	27·37	2·246	15·405		1:6·86

RATION Fed from November 18, for the Remainder of the Year.

Feed.	—	Dry Matter.	Digestible Nutrients.		Nutritive ratio.
			Protein.	Carbohydrates, Fat.	
	Lb.	Lb.			
Turnips	40	4·56	0·40	3·26	
Mixed hay	16	13·71	0·768	6·739	
Bran	4	3·52	0·488	1·827	
Oats	2	1·78	0·184	1·158	
Barley	2	1·78	0·174	1·386	
Oil cake	1	0·90	0·282	0·471	
Cottonseed meal	1	0·92	0·372	0·459	
	66	27·17	2·668	15·300	1 : 5·7

The following table will give the returns for each cow from the time of purchase to the end of the fiscal year. The milk was sold to the men at the Station at 5 cents per quart, surplus skim-milk was fed to the poultry and stock.

RECORDS OF AYRSHIRE COWS.

Name.	Years, Age when purchased.	Date of purchase.	Month freshened.	Number of days in milk during the year.	Number of days dry.	Total pounds of milk during year, or part of year.	Daily average yield of milk.	Total value of milk at 5cts. per quart.	Amount of meal eaten at one and three-eighths cts.	Amount of roots eaten at $2.00 per ton.	Month pasture at $1 per month.	Amount of hay at $10 per ton.	Total cost of feed for year.	Cost of 100 pounds of milk.	Profit on cow during year, labour and calf neglected.
				Days.	Days.	Lb.	Lb.	$ cts.	Lb.	Lb.	No.	Lb.	$ cts.	$ cts.	$ cts.
Island Queen of Spruce Row...	6	April 3rd, 1915..	Nov., 1914..	68	0	1,812	26·65	36 24	732	2,665	.....	976	17 61	0 97	18 63
Lady Petunia of Spruce Row..	4	April 3rd, 1915..	Oct., 1915..	327	37	7,260	22·21	145 24	2,600	9,555	3¼	3,919	68 15	0 94	77 09
Helen of Spruce Row.....	4	Aug. 26th, 1915..	April, 1915..	203	15	3,080	15·17	61 60	1,455	6,160	1	2,727	40 96	1 33	20 64

EXPERIMENTAL FARM, NAPPAN, N.S.

REPORT OF THE SUPERINTENDENT, W. W. BAIRD, B.S.A.

DAIRY CATTLE GRADING EXPERIMENT.

A fairly successful year can be reported from the dairy grading experiment, which has now been carried on continuously for four years; the object of this is to discover the actual cash value of a pure-bred sire in a herd of common or mixed breeding in the increased production of progeny.

As the herd is increasing quite rapidly it will necessitate a much closer study to follow the results obtained from the progeny of the different individuals. Possibly the greatest drawback experienced during the past season was the very low percentage of heifers dropped.

Of the original eleven heifers, termed foundation heifers, only ten remain. These have dropped their first lot of calves from the Ayrshire, Holstein and Guernsey; also second crop of Ayrshire and Holstein, yielding four and five heifers, respectively and have completed their fourth lactation period.

The first crop of calves (first cross Ayrshires) of which there are eight, have dropped their first, second and third crops of calves (second cross Ayrshires) yielding in 1913 five heifers, 1914 four heifers, 1915 two heifers, thus completing their second lactation period.

The second crop of calves from the foundation cows (first cross Holsteins) of which there were six, have dropped their first and second crops of calves (second cross Holsteins) yielding in 1914 three heifers, in 1915 two heifers; thus completing their first lactation period.

The third crop of calves from the foundation cows (first cross Guernseys), of which there are three, dropped their first crop of calves in the fall of 1915, yielding only one heifer.

The first crop from the second cross Ayrshires, of which there were four, yielded only one heifer in the fall of 1915.

The following table gives the fourth year's results in milk production from the foundation cows, second year's production of the first cross Ayrshires and the first year's work in milk production of the first cross Holsteins:—

Name.	Date of dropping calf.	Number of days in lactation period.	Total pounds of milk for period.	Daily average yield of milk.	Average per cent fat in milk.	Pounds of butter produced in period.
		Dys.	Lb.	Lb.	p.c.	Lb.
Maggie	Mar. 8, 1915	308	8,529·9	27·69	4·0	401·41
Jean	Mar. 11, 1915	247	6,900·8	27·94	3·9	316·62
Vera	Dec. 26, 1914	324	7,485·1	23·10	3·8	334·63
Bell	Feb. 18, 1915	224	5,892·3	26·30	3·9	270·35
Mossy	Jan. 6, 1915	304	5,153·2	16·95	4·9	297·07
Jessie	Feb. 23, 1915	264	5,955·4	22·55	4·0	280·25
Ella	Mar. 29, 1915	232	5,491·8	23·67	4·0	258·44
Queen	Dec. 29, 1915	275	5,075·8	18·46	4·0	238·86
Myrtle	Feb. 17, 1915	239	4,667·0	19·53	3·7	203·15
Georgie	Feb. 14, 1915	257	3,975·3	15·47	3·9	182·40
FIRST CROSS AYRSHIRE.						
Jean 1 A	Jan. 21, 1915	252	4,710·8	18·69	3·9	216·14
Mossy 1 A	Dec. 12, 1915	322	3,638·7	11·30	4·3	184·18
Jessie 1 A	Feb. 3, 1915	222	3,947·8	17·78	4·1	190·42
Ella 1 A	Mar. 1, 1915	295	5,671·7	19·23	4·2	280·25
Queen 1 A	Dec. 12, 1915	322	4,698·4	14·59	4·0	221·10
Myrtle 1 A	Mar. 20, 1915	221	2,805·6	12·70	4·0	132·03
Spot 1 A	Dec. 27, 1914	287	6,185·5	21·55	4·1	298·36
Lessie 1 A	Dec. 17, 1914	278	5,398·7	19·42	3·9	247·71
FIRST CROSS HOLSTEIN.						
Mossy 1 H	Mar. 14, 1915	302	4,921·8	16·29	4·6	266·35
Vera 1 H	April 19, 1915	268	5,161·3	19·26	3·8	230·74
Jessie 1 H	Feb. 5, 1915	302	4,677·2	15·41	3·6	198·09
Myrtle 1 H	Mar. 20, 1915	283	4,217·1	14·90	3·4	168·68
Spot 1 H	April 5, 1915	281	3,676·8	13·08	3·8	164·39
Bell 1 H	Jan. 27, 1915	325	3,599·2	11·07	3·8	160·91

NOTE.—All progeny retain the name of the dam, numbers and letter being used to distinguish the breed and crosses of each. For example.

Foundation cow,—Myrtle Born 1909 / First Ayrshire Cross Myrtle 1.A. 1911

- Second Ayrshire Cross Myrtle 1.A.1. 1913
  - Third Ayrshire Cross Myrtle 1.A.1.1.1915
  - Third Ayrshire Cross Mrytle 1.A.1.2. 1916.
  - Third Ayrshire Cross Myrtle 1.A.1.3. B. 1917.
- Second Ayrshire Cross Myrtle 1.A.2. 1914
  - Third Ayrshire Cross Myrtle 1.A.2.1. 1916.
  - Third Ayrshire Cross Myrtle 1.A.2.2.
- Second Ayrshire Cross Myrtle 1.A.3. 1915
  - Third Ayrshire Cross Myrtle 1.A.3.1. 1917.

NAPPAN.

Value of butter at 30 cts. per pound.	Value of skim-milk at 20 cents per cwt.	Total value of product.	Amount of meal eaten, at 1¼ cts. per pound.	Amount of roots and ensilage eaten at $2 per ton.	Amount of hay eaten at $7 per ton.	Amount of green feed eaten, at $3 per ton.	Months on pasture at $1 per month.	Total cost of feed for period.	Cost to produce 100 pounds of milk.	Cost to produce 1 pound of butter, skim-milk neglected.	Profit on 1 pound of butter, skim-milk neglected.	Profit on cow during period, labour and calf neglected.
$ cts.	$ cts.	$ cts.	Lb.	Lb.	Lb.	Lb.	Mos.	$ cts.	$ cts.	cts.	cts.	$ cts.
120 42	16 38	136 80	1,912	6,036	3,350	6,916	4	56 04	0 65	13·96	16·04	80 76
94 99	13 26	108 25	1,513	6,420	3,060	6,916	4	50 42	0 73	15·92	14·08	57 83
100 39	14 40	114 79	1,803	9,340	4,177½	7,966	4½	62 94	0 84	18·80	11·20	51 85
81 11	11 33	92 44	1,359	6,180	2,645	6,916	4	46 80	0 79	17·31	12·69	45 64
89 12	9 80	98 92	1,355	8,980	3,987	7,266	4	54 77	1 06	18·43	11,57	44 15
84 08	11 43	95 51	1,554	8,605	3,760	7,266	4 1/6	56 25	0 94	20·07	9·93	39 26
77 53	10 54	88 07	1,336	7,520	3,495	6,916	4	50 83	0 92	19·66	10·34	37 24
71 66	9 75	81 41	1,332	8,230	3,385	7,496	4	51 97	1 02	21·74	8·26	29 47
60 95	8 99	69 94	1,191	6,698	2,940	6,916	4	46 35	0 99	22·76	7·24	23 69
54 72	7 64	62 36	1,109	6,640	3,030	6,916	4	45 48	1 15	24·93	5·07	16 88

FIRST CROSS AYRSHIRE.

64 84	9 05	73 89	1,099	6,060	2,595	6,916	4	43 25	0 91	20·01	9·99	30 64
55 25	6 96	62 21	903	8,700	3,656	7,966	4½	49 23	1 35	26·72	3·28	12 98
57 13	7 57	64 70	1,080	8,380	3,432	6,069	4	47 32	1 19	24·84	5·16	17 38
84 08	10 87	94 95	1,420	7,300	3,675	6,916	4½	52 28	0 92	18·65	11·35	42 67
66 33	9 02	75 35	1,288	9,360	3,960	8,316	4	56 45	1 21	25·53	4·47	18 90
39 61	5 39	45 00	771	8,800	3,825	6,916	4⅔	46 20	1 64	34·99	–4·99	–1 20
89 51	11 86	101 37	1,680	9,198	3,815	8,746	5	61 58	0 99	20·63	9·37	39 79
74 31	10 38	84 69	1,326	8,100	3,360	6,097	4	49 58	0 91	20·01	9·99	35 12

FIRST CROSS HOLSTEIN.

79 91	9 39	89 30	1,354	7,700	3,975	6,916	4	52 91	1 07	19·86	10·14	36 39
69 22	9 93	79 15	1,418	6,500	3,540	6,916	4	50 98	0 98	22·08	7·92	28 17
59 43	9 02	68 45	1,313	8,260	3,930	6,916	4	52 80	1 12	26·65	3·35	15 65
50 61	8 15	58 76	1,186	7,440	3,780	6,916	4	49 87	1 18	29·56	0·44	8 89
49 32	7 07	56 39	1,138	6,880	3,825	6,916	4	48 86	1 32	29·72	0·28	7 53
48 27	6 93	55 20	1,062	9,680	4,545	6,916	4	53 23	1 47	33·08	–3·08	1 97

The same method is followed for all. Hence it is very easy to trace them back to the foundation stock.

While it is very difficult to draw any definite conclusions from the results obtained as the work is just nicely started, there are, however, a few outstanding features that are worth noting. There is certainly a marked improvement in the majority of the heifers over their dams at the same age. With a few exceptions the heifers are proving as good as or superior to their dams. Again some cows are making marked improvements as they grow older. For instance, Myrtle 1A during the first lactation period gave a loss of $19.75. From the above table it will be noted that she only gave a loss of $1.20, which is certainly a marked improvement over her first year. There are a number of heifers both among the Ayrshire and Holstein crosses that are decidedly better producers than their dams at the same age. On a percentage basis this is greater in the Holsteins than in the Ayrshires. Another factor that is closely associated with the use of a pure-bred sire of a good milking strain in a herd is the feed. The results of judicious feeding are well brought out in this work. For instance the foundation cows were just ordinary heifers when brought in in 1911; some were very poor. They have been given good care and plenty of good feed of the right sort, with the result that 90 per cent gave an average increase of 1,767 pounds in the four years. The highest individual increase was from Maggie. In 1912, her first lactation period, she produced 4,981 pounds; in 1915, her fourth lactation period, she produced 8,529 pounds; a total increase of 3,584 pounds, which is certainly a good showing.

It may be well to state that the production for the past year would have been much better had there not been a failure in the root crop, which meant a smaller amount of succulent food during the winter season when it was most needed.

The following table gives the comparative, also average two-year-old records of the Grade foundation heifers and their progeny, namely, the first-cross Ayrshires and first-cross Holsteins:—

TWO-YEAR-OLD Records of Foundation Cows and Progeny.

Name.	Breed.	No. of days	Lbs. of milk	% Fat.	Lbs. of butter.	Cost of feed.	Profit.	Standing.
						$ cts.	$ cts.	
Jean	Grade Foundation Heifers	389	5,794	3·5	238·59	56 56	26 18	2nd.
Vera	" "	395	5,369	3·5	221·07	56 26	20 42	3rd.
Bell	" "	330	5,465	3·9	250·75	54 15	31 58	1st.
Mossy	" "	368	3,004	4·8	171·40	42 73	14 42	8th.
Jessie	" "	335	3,113	3·9	142·83	39 99	8 84	9th.
Ella	" "	264	3,312	3·7	146·12	38 40	11 82	7th.
Queen	" "	304	4,303	3·9	197·43	47 31	20 19	4th.
Myrtle	" "	384	3,997	4·1	192·79	48 48	17 03	5th.
Spot	" "	398	4,060	4·1	195·84	50 29	16 21	6th.
Averages		351·8	4,268·6	3·9	195·20	48 24	18 52	
Jean 1 A	1st Cross Ayrshire	343	5,013·7	4·0	234·76	49 37	30 68	2nd.
Mossy 1 A	" "	380	3,300·5	4·8	187·63	49 29	13 28	6th.
Jessie 1 A	" "	416	4,278·5	4·8	239·43	61 18	18 80	5th.
Ella 1 A	" "	362	4,641·0	4·5	245·70	52 83	29 74	3rd.
Queen 1 A	" "	377	4,037·6	4·7	223·76	48 93	25 84	4th.
Myrtle 1 A	" "	422	2,066·0	4·1	99·65	53 70	-19 75	7th.
Spot 1 A	" "	338	4,249·3	4·6	229·96	45 05	32 04	1st.
Averages		376·8	3,940·9	4·5	208·70	51 48	18 66	
Vera 1 H	1st Cross Holstein	346	5,161·3	3·8	230·74	50 98	28 17	2nd.
Bell 1 H	" "	413	3,599·2	3·8	160·91	53 23	1 97	6th.
Mossy 1 H	" "	375	4,921·8	4·6	266·35	52 91	36 39	1st.
Jessie 1 H	" "	372	4,677·2	3·6	198·09	52 80	15 60	3rd.
Myrtle 1 H	" "	362	4,217·1	3·4	168·68	49 87	8 89	4th.
Spot 1 H	" "	365	3,676·8	3·8	164·39	48 86	7 53	5th.
Averages		372·1	4,375·6	3·8	198·19	51 44	16 43	

NAPPAN.

The following tables give the comparative yields of the dams and their progeny and their merit of standing as 2-years-olds:—

Name.	Breed.	No. of days.	Lbs. of milk.	% fat.	Lbs. of butter.	Cost of feed.	Profit.	Standing.
						$ ets.	$ cts.	
Jean	G.F.H.	389	5,794·0	3·5	238·59	56 56	26 18	2nd.
Jean 1 A	1st C.Ayr.	343	5,013·7	4·0	234·76	49 37	30 68	1st.
Vera	G.F.H.	395	5,369·0	3·5	221·07	56 26	20 42	2nd.
Vera 1 H	1st C. Hol.	346	5,161·3	3·8	230·74	50 98	28 17	1st.
Bell	G.F.H.	330	5,465·0	3·9	250·75	54 15	31 58	1st.
Bell 1 H	1st C.Hol.	413	3,599·2	3·8	160·91	53 23	1 97	2nd.
Mossy	G.F.H.	368	3,004·0	4·8	171·40	42 73	14 42	2nd.
Mossy 1 A	1st C.Ayr.	380	3,300·5	4·8	187·63	49 29	13 28	3rd.
Mossy 1 H	1st C.Hol.	375	4,921·8	4·6	266·35	52 91	36 39	1st.
Jessie	G.F.H.	335	3,113·0	3·9	142·83	39 99	8 84	3rd.
Jessie 1 A	1st C.Ayr.	416	4,278·5	4·8	239·43	61 18	18 80	1st.
Jessie 1 H	1st C.Hol.	372	4,677·2	3·6	198·09	52 80	15 60	2nd.
Ella	G.F.H.	264	3,312·0	3·7	146·12	38 40	11 82	2nd.
Ella 1 A	1st C.Ayr.	362	4,641·0	4·5	245·70	52 83	29 74	1st.
Queen	G.F.H.	304	4,303·0	3·9	197·43	47·31	20·19	2nd.
Queen 1 A	1st C.Ayr.	377	4,037·6	4·7	223·76	48 93	25 84	1st.
Myrtle	G.F.H.	384	3,997·0	4·1	192·79	48 48	17 03	1st.
Myrtle 1 A	1st C.Ayr.	422	2,066·0	4·1	99·65	53 70	−19 75	3rd.
Myrtle 1 H	1st C.Hol.	362	4,217·1	3·4	168·68	49 87	8 89	2nd.
Spot	G.F.H.	398	4,060·0	4·1	195·84	50 29	16 21	2nd.
Spot 1 A	1st C.Ayr.	338	4,249·3	4·6	229·96	45 05	32 04	1st.
Spot 1 H	1st C.Hol.	365	3,676·8	3·8	164·39	48 86	7 53	3rd.

EXPERIMENTAL STATION, KENTVILLE, N.S.

REPORT OF THE SUPERINTENDENT, W. S. BLAIR.

SHORTHORN CATTLE.

As stated in previous reports, the herd at this Station consists of Shorthorn cattle of Scotch foundation blood, which were selected as representing a good type of farmer's Shorthorns, showing indications of fair milk production, combined with good beef conformation. This herd is not of dairy Shorthorn breeding, but it is being considered from the dairy standpoint. The Shorthorn bull, Lakeview Hero, of a good milking strain but with good beef points, heads the herd, the object being to produce a good beef type of Shorthorn which will give a reasonable flow of milk.

It will be seen from the table giving the yield of milk from this herd that some of the cows compare favourably with good individuals in the milking breeds from a dairy standpoint, and the fact that some of the cows are not profitable milk producers will give an opportunity to determine through their heifers the benefit from using a sire of good milking stock.

There are in all twenty-seven head of registered Shorthorn stock on hand. These consist of one herd bull, ten milch cows, two heifers 2 years old, four yearling heifers, 4 heifer calves, and six bull calves. Besides these there is one grade Shorthorn cow of dual purpose type. Four of the above pure-bred Shorthorns have been purchased during the past year. Two yearling heifers were purchased locally, and two cows, both in calf, were purchased in Ontario.

Five Shorthorn bulls for breeding purposes were disposed of during the year. Three of these were for use in agricultural societies, and two to head breeding herds.

REARING OF YOUNG STOCK.

CALVES.

The calf is left with the mother two or three days after birth, when it is removed and fed on 3 to 4 pounds of whole milk three times per day until 3 to 4 weeks old. The milk is fed fresh from the cow at milking time, and at noon warmed to about 95 degrees. After 3 to 4 weeks calves are started on skim-milk, which feed is increased gradually as the calf grows, but at no time exceeds 20 pounds per day. They are fed skim-milk to 5 or 6 months of age. The calf is taught to eat meal when the change is made from whole to skim-milk, beginning with a very small quantity and increasing according to age. The meal is given to them immediately after feeding the milk. They soon learn to relish it and at the end of two months will take 1 pound a day, which is increased gradually to 6 pounds per day at 10 months old.

The grain ration is made up of equal parts by weight of crushed oats, bran and oil meal. Roots are given when the calf is quite young, and increased in quantity as the calf grows older. Corn ensilage is excellent feed for calves over six months of age, but roots are relished better by younger animals.

When possible early cut clover hay, one of the best feeds for young stock, is fed as much as they will eat up nicely in a short time. If water is not in the box stall in which they are allowed to run so that they can get it as wanted, they are given water at least once a day. Very often calves suffer for want of water, the milk given as a general thing does not satisfy their wants, and in many cases better calves would

be grown if they were watered more regularly. The pails used for feeding the calves are washed clean after each feeding, and scalded once a day. The calves fed as above indicated have made excellent growth and have been entirely healthy. The young stock is kept in box stalls and allowed to run out during warm days in winter. During the summer the calves are kept in during the heat of the day and allowed to run out when it is cool.

YEARLINGS.

During the summer the yearlings are allowed the run of the ravine pasture. This is not a very good pasture but probably compares favourably with the average rough land pasture. They are stabled early in the fall and fed on a ration of 8 pounds hay, 30 pounds of turnips or 20 pounds of ensilage, and 3 to 5 pounds of meal mixture per day. The meal mixture is made up of 100 pounds crushed oats, 100 pounds of oil meal and 100 pounds bran. They have water before them to drink as they require it. Exercise is given in the yard once a day if weather is favourable. As soon in the morning as the milking in the stable is finished they are fed with roots or ensilage on which the meal is scattered, and after this is eaten the hay is given. They are fed roots and ensilage with meal in the afternoon about four o'clock, and when this is consumed they are given hay.

RAISING SHORTHORN HEIFERS.

The cost of raising heifers is given in the following tables. These heifers have been fed just what is considered necessary to keep them in good growing condition. As calves they were reared as outlined in the feeding of calves and as yearlings as indicated for the feeding of yearlings.

The cost of heifers Kentville Jessamine and Kentville Princess for the first year is not given owing to records of feed consumed not having been kept. The average cost to one year of age of the four given in the table is $36.55. Their average weight was 625 pounds each. This added to the cost of Kentville Jessamine and Kentville Princess would bring their cost to the calving period, $89.83 and $96.21, respectively. Kentville Prineess through an accident due to falling off a precipice in the ravine pasture and breaking her hip bone, had to be kept in during two months of the summer, which materially added to her cost. No charge has been made for the value of the calf to start with, as its value is fairly offset by the calf produced by the heifer, and the manure is considered equal in value to the cost of labour for tending.

KENTVILLE.

Name and Feeding Period.	Whole milk at $1.60 per hundred.	Skim-milk at 20 cents per hundred.	Meal at $1 60 per hundred.	Roots at $2 per ton.	Ensilage at $3 per ton.	Hay at $12 per ton.
Kentville Princess.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
Birth, 12 to 18 mos.; Oct. 23rd, 1914 to April 23rd, 1915	.....	.....	704	2,550	1,325	1,659
18 mos. to 2 years; April 23rd, 1915, to Oct. 23rd, 1915	.....	.....	438	280	700	938
2 years to calving; Oct. 23rd, 1915, to Jan. 20th, 1916	.....	.....	512	2,155	1,400	868
12 mos. to calving; Oct. 23rd, 1914, to Jan. 20th, 1916	.....	.....	1,654	4,985	3,425	3,465
Kentville Jessamine.						
Birth, 12 to 18 mos.; Oct. 3rd, 1914, to April 3rd, 1915	.....	.....	704	2,550	1,325	1,659
18 mos. to 2 years; April 3rd, 1915 to Oct. 3rd, 1915	.....	.....	210	.....	1,120	434
2 years to calving; Oct. 3rd, 1915, to Jan. 4th, 1916	.....	.....	409	2,119	549	850
12 mos. to calving; Oct. 3rd, 1914, to Jan. 4th, 1916	.....	.....	1,323	4,669	2,994	2,943
Kentville Victoria.						
Birth to 6 mos.; Mar. 5th, 1914, to Sept. 5th, 1914	270	2,170	325	.....	.....	315
6 mos. to 1 year; Sept. 5th, 1914, to Mar. 5th, 1915	.....	.....	565	2,080	485	1,140
1 year to 18 mos.; Mar. 5th, 1915, to Sept. 5th, 1915	.....	.....	294	140	1,400	462
18 mos. to 2 years; Sept. 5th, 1915, to Mar. 5th, 1916	.....	.....	894	3,375	1,655	1,572
Birth to 2 years; Mar. 5th, 1914, to Mar. 5th, 1916	270	2,170	2,078	5,595	3,540	3,489
Kentville Blossom.						
Birth to 6 mos.; Nov. 15th, 1914, to May 15th, 1915	144	2,756	306	665	.....	231
6 mos. to 1 year; May 15th, 1915 to Nov. 15th, 1915	.....	2,690	763	1,210	.....	1,148
Birth to 1 year; Nov. 15th, 1914, to Nov. 15th, 1915	144	5,446	1,069	1,875	.....	1,379
Kentville Victoria 2nd.						
Birth to 6 mos.; Mar. 6th, 1915, to Sept. 6th, 1915	273	2,168	327	.....	.....	315
6 mos. to 1 year; Sept. 6th, 1915, to Mar. 6th, 1916	.....	917	704	1,141	785	952
Birth to 1 year; Mar. 6th, 1915, to Mar. 6th, 1916	273	3,085	1,031	1,141	785	1,267
Kentville Maid.						
Birth to 6 mos.; Mar. 11th, 1914, to Sept. 11th, 1914	270	2,170	325	.....	.....	315
6 mos. to 12 mos.; Sept. 11th, 1914, to Mar. 11th, 1915	.....	.....	565	2,080	485	1,140
12 mos. to 18 mos.; Mar. 11th, 1915, to Sept. 11th, 1915	.....	.....	294	140	1,400	462
18 mos. to 2 years; Sept. 11th, 1915, to Mar. 11th, 1916	.....	.....	894	3,375	1,655	1,572
Birth to 2 years; Mar. 11th, 1914, to Mar. 11th, 1916	270	2,170	2,078	5,595	3,540	3,489

Molasses at 19 cents a gallon.	Pasture at $1 per month	Number of days in period.	Average cost per day.	Weight at beginning of period.	Weight at end of period.	Gain.	Average daily gain.	Cost to produce 1 pound gain.	Total cost.
Gal.	Mos.		Cts.	Lb.	Lb.	Lb.	Lb.	Cts.	$ cts.
7	.....	182	14·874	550	840	290	1·59	9·334	27 07
.....	2	183	8·716	840	994	154	0·841	10·357	15 95
.....	.....	89	19·82	994	1,135	141	1·584	12·510	17 64
7	2	454	13·36	550	1,135	585	1·288	10·374	60 69
7	.....	182	14·874	562	856	294	1·615	9·207	27 07
.....	4	183	6·36	856	995	139	0·759	8·374	11 64
.....	.....	92	15·837	995	1,120	125	1·358	11·656	14 57
7	4	457	11·658	562	1,120	558	1·221	9·548	53 28
.....	.....	184	8·56	75	330	255	1·385	6·176	15 75
.....	.....	181	10·32	330	560	230	1·27	8·121	18 68
.....	3 mos. 11 days.	184	7·10	560	763	203	1·103	6·438	13 07
.....	.....	181	16·342	763	1,095	332	1·834	8·912	29 59
.....	3 mos. 11 days.	730	10·56	75	1,095	1,020	1·397	7·55	77 09
.....	.....	181	8·143	80	320	240	1·325	6·141	14 74
.....	.....	184	13·961	320	667	347	1·88	7·41	25 68
.....	.....	365	11·073	80	667	587	1·609	6·885	40 42
.....	.....	184	8·59	74	305	231	1·25	6·84	15 82
.....	.....	182	11·600	305	645	340	1·868	6·211	21 12
.....	.....	366	10·092	74	645	571	1·56	6·469	36 94
.....	.....	184	8·56	75	315	240	1·304	6·562	15 75
.....	.....	181	10·32	315	534	219	1·209	8·529	18 68
.....	3 mos. 11 days.	184	7·103	534	705	171	0·929	7·643	13 07
.....	.....	181	16·343	705	965	260	1·436	11·38	29 59
.....	3 mos. 11 days.	730	10·56	75	965	890	1·219	8·661	77 09

COST OF RAISING A BULL ON SKIM-MILK AS COMPARED WITH RAISING ONE ON THE COW.

Below is given in detail the cost of raising a bull calf largely with skim-milk during the first six months, as compared with one which was allowed to suckle the cow. The quantity of milk used by the calf is calculated from the yield of milk produced the previous year by the cow during a similar period. The milk averaged 20 pounds or 8 quarts per day, and its value is calculated on the basis of 4 cents per quart. The cost for whole milk, therefore, averaged 32 cents per day. It will be

Name and Feeding Period.	Whole milk at $1.60 per hundred.	Skimmilk at 20 cents per hundred.	Meal at $1.60 per hundred.	Roots at at $2 ton.	Ensilage $3 per ton.
Kentville Sovereign.	Lb.	Lb.	Lb.	Lb.	Lb.
Birth to 6 mos.; May 15th, 1914, to November 15th, 1914	270	2,000	300	.....	.....
6 mos. to 12 mos.; November 15th, 1914, to May 15th, 1915	.....	.....	686	2,905	280
12 mos. to 18 mos.; May 15th, 1915, to November 15th, 1915	.....	.....	1,065	970	1,400
18 mos. to date of sale; November 15th, 1915, to March 1st, 1916	.....	.....	636	1,960	1,810
Cost from May 15th, 1914, to date of sale; March 1st, 1916	270	2,000	2,687	5,835	3,490
Kentville Chief.					
Birth to 6 mos.; July 9th, 1914, to January 9th, 1915.	3,180	.....	282	790	.....
6 mos. to date of sale; January 9th, 1915, to May 25th, 1915	.....	.....	660	932	1,723
Cost for 320 days	3,180	.....	942	1,722	1,723

noticed that Kentville Chief, fed on whole milk, made a daily average gain during the first six months of 2·47 pounds, as compared with 1·38 pounds for Kentville Sovereign, fed largely on skim-milk. The former cost $78.20 and weighed 775 pounds at the end of 320 days, as compared with $31.63 for Kentville Sovereign, who weighed 580 pounds in the same number of days. The increase in weight of 195 pounds, therefore, cost $46.57.

As only two calves are included in this trial the results cannot be considered definite. Nevertheless the costs of production appear to be in accordance with similar tests made elsewhere. Further data on this subject will be reported in the future.

Hay at $12 per ton.	Molasses at 19 cts. per gallon.	Number of days in period.	Average cost per day.	Weight at beginning of period.	Weight at end of period.	Gain.	Average daily gain.	Cost to produce 1 pound.	Total cost.
Lb.	Cts		Cts.	Lb.	Lb.	Lb.	Lb.	Cts.	$ cts.
350		184	8·27	80	335	255	1·386	5·968	15 22
1,176	20	182	11·98	335	630	295	1·62	7·39	21 81
1,483		184	15·76	630	955	325	1·766	8·923	29 00
1,060		106	20·00	955	1,165	210	1·98	10·095	21 20
						1,085	1·656	8·039	87 23
500		183	32·33	92	544	452	2·47	13·09	59 18
754	17	137	13·88	544	775	231	1·68	8·2	19 02
1,254	17	320	24·43	92	775	683	2·13	11·4	78 20

CARE OF HERD BULL LAKEVIEW HERO.

In order to keep the herd bull in better condition a shed was built on the east corner of the steer barn 12 by 14 feet in size, with a yard attached 14 by 50 feet to which the bull has free access during the greater part of the year. It is found that he is much more active when given this freedom and certainly is much better from having an opportunity to exercise at will in the open air.

The cost of feeding this bull for the year was as follows:—

	Pounds.	Cost per Cwt.	Total Cost.
Meal mixture	1,629	$1 60	$26 06
Roots	7,100	10	7 10
Ensilage	4,040	15	6 06
Hay	4,000	60	24 00

Cost per day—$0·17.
" week—$1·21.

His increase in weight during the period was 270 pounds. His present weight is 2,075 pounds. His age is 3 years and 5 months.

The meal mixture fed to all the bulls and all young stock is made up as follows:—

100	pounds	bran at $1.20 per hundred	$1 20
100	"	ground oats at $1.55	1 55
100	"	oilmeal at $2.05	2 05
300	"	cost	$4 80
		Cost per hundred	$1 60

DAIRY COWS.

The work about the stable is done with as much regularity as possible. The cows are milked at 6.30 a.m. and at 5 p.m. In the morning they are fed immediately after milking, first with roots or ensilage with the meal mixture scattered on it, and then with hay. In the afternoon at 4 o'clock they are fed ensilage or roots with the meal and the hay is given after the milking is done. The stables are cleaned out twice each day. The cattle are groomed once a day.

Owing to a shortage of sufficient pasture the cows have not had a good opportunity to do as well as they might have done. During the past summer ensilage has been used largely to supplement the pasture. In addition to this meal and hay has been fed. The pasture available for the cows consists of about three acres on which they were allowed to run during the nights. Duriug the first part of the summer they required less indoor feeding than later on. Then ensilage and hay were fed as already outlined but in less quantity, the meal was fed at the rate of 1 pound to 4 pounds of milk produced.

The summer meal mixture was made up of the following:—

200	pounds	wheat bran at $1.20 per cwt	$2 40
200	"	ground oats at $1.55 per cwt	3 10
100	"	cottonseed meal at $1.80 per cwt	1 80
100	"	oil meal at $2.05	2 05
600	"	cost	$9 35
Cost per hundred			$1 56

It will be seen therefore that the summer feeding is much more expensive than it would be were good pastures available.

The succulent feed during the past winter has consisted of roots and ensilage mixed in equal parts. The meal ration has been at the rate of 1 pound for each 3

pounds of milk produced. The meal mixture used was the same as that given for summer feeding. The winter ration per cow per day averaged as follows:—

		Cents.
12	pounds hay at $12 per ton	7·2
25	" ensilage at $3 per ton	3·75
25	" roots at $2 per ton	2·5
8	" meal mixture at $1.56 per cwt	12·48
	Cost per day	25·93

The milk from each cow is weighed at every milking, and a sample of each cow's milk is taken every ten days and tested each month for butter-fat. The milk above that sold the farm hands is separated and the cream sent to the Acadia Dairy Company, Wolfville, and the skim-milk is fed to the calves.

The cows have produced better than during their previous lactation period. It will be noticed that the lactation period is usually short as the cows are bred as early as possible. Four of the cows are in the Record of Performance test starting in January and February, 1916. Two of the heifers freshened during January and give promise of being good producers.

KENTVILLE.

The record from the cows during the last lactation period is given in the following table:—

Name of Cow.	Age.	Number of days dry before calving.	Date of dropping calf.	Number of days in lactation period.	Total pounds of milk for period.	Daily average yield of milk.	Average per cent of fat in milk.	Pounds of butter produced in period.	Value of butter at 30 cents per pound.	Value of skim-milk at 20 cents cwt.
					Lb.	Lb.	p.c.	Lb.	$ cts.	$ cts.
Grade Shorthorn	.....	47	May 17, 1915..	265	7,317·75	27·61	3·91	336·427	100 93	13 96
Hillview Victoria	8 yrs.	101	Mar. 7, 1915..	256	6,509·0	25·42	3·86	296·02	88 80	12 43
Meadow Maid	6 "	94	Mar. 1, 1915..	231	5,304·25	22·96	4·26	266·12	79 83	10 07
Meadow Princess	6 "	47	Oct. 17, 1914..	301	4,816·25	16·0	4·14	234·69	70 41	9 16
Meadow Blossom	6 "	96	Dec. 1, 1914 .	283	5,207·5	18·40	4·05	248·12	74 44	9 92
Burnbrae Fairy	4 "	78	Nov. 5, 1914 .	275	3,554·5	12·92	4·13	172·7	51 81	6 76
Louisa May 2nd	6 "	145	April 11, 1915..	189	3,382·0	17·89	3·53	149·7	42 21	6 52

Total value of Product.	Amount of meal eaten at 1·56 cts., per pound.	Amount of roots eaten at $2 per ton.	Amount of ensilage eaten at $3 per ton.	Amount of hay eaten at $12 per ton.	Months on pasture at $1 per month.	Total cost of feed for period from calving to calving.	Cost to produce 100 lb. milk.	Cost to produce one lb. butter skim-milk not included	Profit or loss on one lb. butter skim-milk not included	Profit or loss on cow during period, Labour and Calf not included.
$ cts.	Lb.	Lb.	Lb.	Lb.	Months.	$ cts.	Cts.	Cts.	Cts.	$ cts.
114 89	2,580	4,410	7,037	2,378	4	73·46	100·3	21·8	8·2	41 43
101·23	2,215	6,500	6,500	3,170	4	73·82	113·4	24·94	5·06	27 41
89,90	1,850	6,000	6,000	2,804	4	64·68	121·9	24·30	5·7	25 22
79 57	1,697	6,500	6,500	3,557	3	67·06	139·2	28·58	1·42	12 51
84 36	2,020	6,300	6,300	3,378	4⅓	71·88	138·0	28·97	1·03	12 48
58 57	1,375	6,500	6,500	3,288	4	61·43	172·8	35·57	−5·57	↱ 2 86
48 73	1,441	6,500	6,500	3,236	4	62·15	183·7	44·36	−14·36	−13 42

EXPERIMENTAL STATION, FREDERICTON, N.B.

REPORT OF THE SUPERINTENDENT, W. W. HUBBARD.

DAIRY CATTLE.

When the year began there were milking three Ayrshire cows, two Shorthorn cows, two Holstein cows and twenty grade cows. During the year two grade cows died from blood poisoning arising from udder troubles. Two Shorthorns and two Holsteins were purchased. One Shorthorn heifer, three Ayrshire heifers, and nine grades freshened.

Pasturage during the season, while abundant, was not of very good quality; much of the land was in stumps and the growth, owing to the very wet season, was of the coarser grasses. Ensilage was fed until the middle of June, and a month later soiling crops of peas, oats and vetches were fed followed by green corn and white turnips. Fly repellent was used freely, and while the Horn fly was not entirely kept away, one result is that no warble flies attacked cattle at all. Even the heifers that were not frequently treated showed no signs of warbles.

The Holstein bull has proved himself an impressive sire on grade cows. Ten of his grade heifers are being reared in connection with the grading-up experiment, and though from mothers of very diverse types, these heifers are remarkably uniform and strong in Holstein type and appearance.

Two Shorthorn bulls are in use. "Oxford Director"—94757—at 27 months, weighs 1,575 pounds, and "Jilt's Denis"—104840—at 22 months weighed 1,250 pounds. This season's calf crop is from "Oxford Director" and next year's grades will be from "Jilt's Denis," as the Ayrshire bull "Springbank King Theodore" at 12-15 months was not mature enough for the work. "Jilt of Northlynd"—85630—the dam of this young bull made a season's record in 1914-15 of 11,013 pounds milk and 481·5 pounds butter.

The method of calf rearing followed at this Station is to remove the calf from the cow as soon as dropped and to hand feed from the pail. The mother's milk is given, about a pint at a time four or five times per day for the first four days, the quantity is gradually increased and the number of feedings decreased to twice per day. At from ten days to a fortnight after birth, sweet warm skim-milk is mixed with the whole milk, the proportion of skim-milk increasing daily until at three weeks the calf is taking skim-milk entirely. Ground oilcake scalded is added to the skim-milk and a mixture of oilcake and crushed oats given dry. Skim-milk feeding is continued as long as possible. Bran and cornmeal are added to the grain ration as the calf grows. Hay, roots and ensilage are fed according to the appetite of the calf.

The data of the herd are given in the following table:—

Name of Animal and Breed.	Date of freshening.	Period of lactation.	Weight of milk.	Per cent butter fat.	Pounds of butter.	Pounds of skim-milk.	Value of Butter at 28 ct. per lb.	Value of Skimmilk at 20c. per cwt.	Cost per 100 lb. of milk.	Cost per lb. of butter.	Total value of products calf and manure no included.	Approximate cost of feed.	Profit.
			Lb.				$ cts.	$ cts.	$ cts.	Cts.	$ cts.	$ cts.	$ cts.
Pansy	A July 28, 1914	366	10,233·5	3·9	458·4	9,834·9	128 35	19 67	0 69	0 15	148 02	71 21	76 81
Twilight	A Sept. 11, 1914	313	4,897·0	4·5	255·5	4,674·8	71 54	9 35	1 15	0 22	80 89	56 57	24 32
Dawn	A Oct. 23, 1914	282	6,175·9	4·3	305·3	5,910·4	85 48	11 82	0 88	0 17	97 30	54 43	42 87
Jilt	S. May. 29, 1914	457	11,012·9	3·8	480·5	10,594·2	134 54	21 19	0 69	0 15	155 73	76 58	79 15
Nettie	S. Oct. 8, 1915	173	4,096·3	3·6	168·9	3,961·8	47 29	7 92	0 90	0 21	55 21	36 99	18 22
Helen K	H Dec. 31, 1914	334	5,100·3	3·8	223·7	4,905·8	62 64	9 81	1 20	0 27	72 45	61 51	10 94
Rue Bell	H Mar. 31, 1915	235	6,354·2	3·0	219·7	6,163·1	61 52	12 32	0 70	0 20	73 84	44 99	28 85
Madge	G May 21, 1915	173	3,412·7	3·8	148·2	3,283·8	41 50	6 57	1 05	0 24	48 07	36 17	11 90
Blossom	G April 11, 1915	267	5,325·9	3·8	237·4	5,119·4	66 47	10 24	0 78	0 17	76 71	41 88	34 83
Hannah	G April 4, 1915	229	4,521·9	3·7	195·0	4·352·3	54 60	8 70	0 95	0 22	63 30	43 16	20 14
Tiny	G July 7, 1915	266	5,013·7	3·4	197·8	4,841·7	55 38	9 68	1 15	0 29	65 06	58 02	7 04
Muffy	G May 20, 1914	381	6,441·8	5·0	376·6	6,114·3	105 45	12 23	0 88	0 15	117 68	56 71	60 97
Brindle	G June 12, 1915	292	5,516·6	5·0	310·5	5,246·6	86 94	10 49	0 82	0 14	97 43	45 36	52 07
Julia	G April 15, 1915	329	6,056·3	3·8	266·2	5,824·8	74 54	11 65	1 09	0 24	86 19	66 26	19 93
Nellie	G June. 2, 1914	608	7,236·2	3·9	322·6	6,955·7	90 33	13 91	1 03	0 23	104 24	74 97	29 27
Kate	G May 31, 1915	248	4,423·0	4·0	204·1	4,245·5	57 15	8 49	1 18	0 25	65 64	52 30	13 34
Alma	G June 22, 1915	247	4,001·4	4·2	193·0	3,833·5	54 04	7 67	1 20	0 24	61 71	48 12	13 59
Jersey	G Nov. 23, 1914	283	4,749·6	5·1	278·4	4,507·5	77 95	9 01	0 96	0 16	86 96	45 72	41 24
May	G Nov. 10, 1914	283	5,351·2	4·1	255·4	5,129·1	63 51	10 26	1 05	0 22	73 77	56 26	17 51
Maggie	G Sept. 12, 1914	252	4,576·5	4·3	236·3	4,371·0	66 16	8 74	1 01	0 19	74 90	46 36	28 54
Zaffi	G Dec. 18, 1914	223	3,743·9	5·1	220·1	3,552·5	61 63	7 11	1 66	0 28	68 74	62 47	6 27
Blanche	G Dec. 23, 1914	273	5,198·7	4·8	289·7	4,946·8	81 12	9 89	1 08	0 19	91 01	56 60	34 41
Queenie	G Feb. 14, 1915	254	6,428·7	3·5	260·0	6,202·6	72 80	12 40	0 73	0 18	85 20	47 16	38 04
Alice	G Feb. 25, 1915	316	5,830·1	4·2	283·0	5,584·0	97 24	11 17	0 95	0 19	90 41	55 93	34 48
Ella	G Feb. 27, 1915	345	4,948·1	4·0	231·6	4,746·7	64 85	9 49	1 20	0 25	74 34	59 80	14 54
Daisy	G Mar. 23, 1915	234	5,168·7	3·9	234·6	4,964·7	65 69	9 93	0 87	0 19	75 62	45 20	30 42
Bessie	G Mar. 27, 1915	229	4,480·9	3·8	196·2	4,310·3	54 94	8 62	1 03	0 23	63 56	46 16	17 40
Spot	G Mar. 31, 1915	182	4,223·9	4·0	193·0	4,056·1	54 04	8 11	0 93	0 20	62 15	39 38	22 77
Sally	G April 11, 1915	272	5,367·4	4·0	251·1	5,148·3	70 31	10 37	0 86	0 16	80 68	46 47	34 21
Shannon	G May 5, 1915	280	4,957·6	4·1	238·3	4,750·4	66 72	9 50	0 93	0 19	76 22	46 68	29 54
Dorothy	G May 27, 1915	283	4,007·5	3·8	175·3	3,855·1	49 08	7 71	1 03	0 23	56 79	41 30	15 49
Betty	G Dec. 6, 1914	290	6,111·0	4·3	299·6	5,850·5	83 89	11 70	0 78	0 16	95 59	48 09	47 50

CALF FEEDING EXPERIMENT.

Sixteen grade dairy calves were procured during the winter and on the 1st March, 1915, were divided into four lots of four each to test the relative cost of feeding per pound of increase in weight, the four following rations being used:—

Lot 1.—Whole milk.

Lot 2.—Skim-milk with a grain mixture of oats two parts, cornmeal four parts, and ground oilcake one part.

Lot 3.—Blatchford's calf meal and water.

Lot 4.—Blatchford's calf meal and skim-milk.

Ensilage and hay were fed as demanded by the appetite of the calves.

The average age of the calves when the experiment started was ten weeks. They had all been given the same feeding, viz., whole milk, till two weeks old, then part whole and part skim till they were four weeks old; after that they had skim-milk, ground oilcake, crushed oats and bran with what hay and roots they would eat. They were put on their respective test rations a few days before the experiment began to get them accustomed to the change in feeding.

The price per ton of the various feeds used was as follows: Oats, $40; cornmeal, $38; oilcake, $40; Blatchford's calf meal, $80; whole milk, $25; skim-milk, $4; ensilage, $2; hay, $7.

Details of Experiment.

		Lot 1.	Lot 2.	Lot 3.	Lot 4.
Number of calves in test		4	4	3	4
Total weight at beginning of experiment	lb.	585	668	482	607
Average weight at beginning of experiment	"	146·25	167	160·66	151·75
Total weight at end of 3 months	"	1,373	1,338	845	1,277
Average weight at end of 3 months	"	343·25	334·5	281·66	319·25
Total gain per lot	"	788	670	363	670
Average gain per calf	"	197	167·5	121	167·5
Average gain per calf per day	"	2·14	1·82	1·31	1·82
Total meal consumed per lot	"	182	523	526·5	234
Total whole milk consumed per lot	"	6·160	.....	.....	.....
Total skim milk consumed per lot	"	.....	6,272	.....	6,188
Total hay consumed per lot	"	1,104	1,104	828	1,104
Total roots and silage consumed per lot	"	1,596	1,596	1,197	1,596
Cost of meal fed per lot	$	3·18	9·15	21·06	9·36
Cost of meal per head	"	0·79	2·29	7·02	2·34
Cost of meal fed per head per day	c.	·85	2·5	7·6	2·5
Cost of whole milk fed per lot	$	77·00	.....	.....	.....
Cost of skim milk per head per day	c.	.....	3·45	.....	3·37
Total cost of feed per head	$	21·41	6·79	8·38	7·00
Cost of feed per head per day	c.	23·3	7·4	9·1	7·6
Cost to produce 1 lb. of gain	"	10·8	4·05	6·9	4·18
Profit over whole milk ration in producing 1 lb. of gain	"	.....	6·75	3·9	6·62
Lbs. of meal matter to produce 1 lb. gain	lb.	·23	·78	1·45	·35
Lbs. of whole milk to produce 1 lb. gain	"	7·81	.....	.....	.....
Lbs. of skim milk to produce 1 lb. gain	"	.....	9·36	.....	9·23

EXPERIMENTAL STATION, STE. ANNE DE LA POCATIERE, QUE.

REPORT OF THE SUPERINTENDENT, JOS. BEGIN.

DAIRY CATTLE.

The dairy herd now comprises twenty-nine head of pure-bred Ayrshire cattle, as follows: A 4-year-old bull, two young bulls 13 and 15 months old, thirteen dairy cows, four yearling heifers, seven heifer calves, and two bull calves dropped in the spring. There are also thirteen grade cows of mixed breeding, purchased in 1914; four yearling heifers, first-cross Ayrshire, the progeny of these cows; and two heifer calves dropped in the spring.

GRADING EXPERIMENT.

The object of this experiment with common cows of mixed breeding is to discover what improvement may be effected by using a pure-bred bull of high quality on such a herd. These common cows shall be kept until we have a sufficient number of foundation Ayrshire grade heifers, or "first-cross Ayrshires." All the female progeny of these heifers, bred to the best Ayrshire bull that can be procured, shall be called "second-cross Ayrshires," the third generation shall be called "third-cross Ayrshires," and so on. We hope to be able to prove by this experiment that the use of a good pure-bred sire on a common herd causes an increase of production in the progeny of this herd, but it is not expected that results will be available before a few years' time.

FEEDING THE HERD.

The pastures at this Station are fairly large but very stony and not very productive. They are at the end of the farm opposite the building and the cows have to walk a long way twice per day, which is another disadvantage. Experience during the last two years shows that an exaggerated amount of exercise causes a rather large decrease in the production of milk, no matter how generously the animals may be fed. A large quantity of succulent feed, in the shape of green fodder, was given to the cows in the stable. As the flies were becoming more aggressive during the hot days of summer, the cows were put in the stable during the day and on the pasture during the night. The main ration for winter feeding is roots and corn ensilage.

The yields of the cows that have completed a lactation period during the year are given in the following table:—

PURE BRED AYRSHIRE COWS.*

Name of Cows.	Age at beginning of Lactation Period.	Date of Dropping Calf.	Number of days in Lactation Period.	Total Pounds of Milk for Period.	Daily average Yield of Milk.	Average per cent Fat in Milk.	Pounds of Butter produced in Period.	Value of Butter at 28c. per lb.
	Yrs.		Days.	Lb.	Lb.	p.c.	Lb.	$ cts.
Flavia's Girl	6	Jan. 25, 1915	364	7,600	20·89	4·10	366·59	102·65
Marjorie 2nd	10	Mar. 2, 1915	320	7,370	23·03	4·12	357·22	100·02
Denty 3rd	5	Jan. 22, 1915	374	7·172	19·18	3·96	345·90	96·85
Margaret of Ottawa	4	Aug. 22, 1914	402	6,383	15·38	4·70	353·00	98·84
Flavia's Spot	4	Jan. 8, 1915	371	7,593	20·46	3·75	335·00	93·80
Soncy 3rd of Ottawa	7	Jan. 27, 1915	353	7,213	20·43	3·82	324·17	90·77
Jessie G	3	Oct. 4, 1914	474	5,731	12·09	5·02	338·46	94·77
Duchess Flavia	4	Sept. 13, 1914	380	6,382	16·79	4·10	307·83	86·19
Princess Denty	3	Oct. 29, 1914	340	5,137	15·11	4·72	285·25	79·87

GRADE COWS.*

D	4	Mar. 26, 1915	391	7,895	20·19	4·85	454·79	127·34
H	5	Mar. 31, 1915	354	9,395	26·54	4·12	455·38	127·51
F	4	Apr. 14, 1915	275	6,996	25·44	3·68	302·89	84·81
L	4	June 11, 1915	293	6,692	22·84	4·06	319·64	89·50
J	4	May 4, 1915	321	6,009	18·72	4·05	286·30	80·16
G	4	April 1, 1915	343	5,690	16·59	4·22	282·49	79·10
C	4	May 2, 1915	243	4,753	19·56	3·76	210·23	58·86
O	4	April 1, 1915	275	4,059	14·76	4·42	211·06	59·09
M	4	April 20, 1915	284	4,545	16·00	3·96	211·74	59·29
P	4	May 12, 1915	255	3,975	15·59	4·24	198·28	55·52
I	4	Mar. 21, 1915	314	4,519	14·39	3·78	200·96	56·27
B	4	Mar. 4, 1915	296	3,613	12·20	4·15	176·40	49·39

* Table completed overleaf.

PURE BRED AYRSHIRE COWS—*Continued.*

Name of Cows.	Value of Skim Milk at 20c. per cwt.	Total value of Product.	Amount of Meal Eaten, at 1½c. per pound.	Amount of Roots and Ensilage Eaten, at $2 per ton.	Amount of Hay Eaten, at $7 per ton.	Amount of Green Feed Eaten, at $3 per ton.	Amount of Straw Eaten, at 20c. per cwt.	Months on Pasture, at $1 per month.	Total Cost of Feed between Calvings.	Cost to Produce 100 pounds Milk.	Cost to Produce 1 pound of Butter (skim-milk neglected).	Profit on 1 pound Butter (skim-milk neglected).	Profit on Cow between Calvings (labour and calf neglected).
	$ cts.	$ cts.	Lb.	Lb.	Lb.	Lb.	Lb.	Mo.	$ cts.	Cts.	Cts.	Cts.	$ cts.
Flavia's Girl	14·57	117·22	3,175	6,700	3,120	1,500	400	2	64·35	84·67	17·55	10·45	52·87
Majorie 2nd	14·13	114·15	3·240	6,400	3,350	1,500	350	4	65·42	88·76	18·31	9·69	48·73
Denty 3rd	13·77	110·62	3,045	6,700	3,250	1,500	500	4	63·38	88·37	18·32	9·68	47·24
Margaret of Ottawa	12·16	111·00	3,185	6,245	3,120	1,400	500	4	64·08	100·00	18·15	9·85	46·92
Flavia's Spot	14·61	108·41	2,985	6,500	3,090	1,500	450	4	61·78	81·36	18·44	9·56	46·63
Soncy 3rd of Ottawa	13·87	104·64	2,920	6,500	3,050	1,500	500	4	60·90	84·43	18·78	9·22	43·74
Jessie G	10·89	105·66	3,346	6,230	3,240	1,400	500	4	66·50	116·03	19·64	8·36	39·16
Duchess Flavia	12·24	98·43	2,840	6,500	3,250	1,400	500	4	60·48	94·96	19·64	8·36	37·95
Princess Denty	9·78	89·65	2,785	6,025	3,046	1,400	500	4	58·61	100·14	20·54	7·46	31·04

GRADE COWS—*Continued.*

D	15·03	142·37	2,425	6,230	3,120	1,250	350	4	54·04	68·46	11·88	16·12	88·33
H	18·01	145·51	3,205	6,820	3,480	1,500	400	4	66·11	70·36	14·51	13·49	79·40
F	13·48	98·28	1,970	5,850	2,845	1,250	350	4	47·02	67·20	15·52	12·48	51·26
L	12·84	102·31	2,235	5,940	3,256	1,250	400	4	51·93	77·60	16·24	11·76	50·38
J	11·53	91·69	1,945	6,128	3,120	1,250	400	4	48·04	79·94	16·77	11·23	43·65
G	10·90	89·99	2,345	6,140	3,220	1,250	350	4	53·65	94·28	19·00	9·00	36·34
C	9·15	68·01	1,875	5,380	2,660	1,250	350	4	44·71	94·06	21·22	6·77	23·30
C	7·76	66·85	1,742	5,370	2,875	1,250	400	4	43·89	100·08	20·71	7·29	22·96
M	8·73	68·02	1,826	5,420	2,945	1,250	400	4	45·24	99·54	21·36	6·64	22·78
P	7·61	63·12	1,588	5,250	2,740	1,250	400	4	41·37	100·04	20·86	7·14	21·75
J	8·70	64·96	1,843	5,275	2,640	1,250	400	4	44·24	97·89	22·01	5·99	20·72
B	6·57	56·36	1·512	4,040	2,420	1,400	400	4	38·31	106·03	21·71	6·29	18·05

COST OF RAISING HEIFERS.

A careful record is kept of all feed consumed by the calves, in order to find out the total cost of raising a dairy cow. The feed consumed by each of the heifers has been carefully recorded, in order to find out the cost of a heifer at the first calving. The detailed cost of seven heifers raised on this Station up to the 31st of March is given in the following table:—

PURE-BRED Ayrshire Heifers.

Name and Registration Numbers.	Date of Birth.	Weight at 2 Days.	Weight at 6 mos.	Age of Heifers Mar. 31.	Weight of Heifers Mar. 31.	FOOD CONSUMED.					
						Whole milk at $1.60 per 100 lbs.	Skim-milk at 20c. per 100 lbs.	Grain at 1¼c. per lb.	Hay at $7 per ton.	Roots at $2 per ton.	Total Cost.
		Lb.	Lb.	Days.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	$
Malonie —44954	Aug. 22, 1914	49	356	586	820	945	3,170	625	1,430	3,540	37·82
Flore —44952	Sept. 13, 1914	47	320	564	715	928	3,130	580	1,280	3,285	36·12
Florence —47190	Jan. 8, 1915	52	290	448	675	954	3,220	372	725	1,520	30·41
Florida —47189	Jan. 25, 1915	56	315	431	720	925	3,250	354	675	1,450	29·54

FIRST-CROSS Ayrshire Heifers.

G,—O—A (1915)	April 1, 1915	54	295	365	565	942	2,885	358	590	1,210	28·60
J, —O—A (1915)	May 15, 1915	60	315	321	615	860	2,900	335	575	1,120	26·88
M,—O—A (1915)	May 12, 1915	58	280	324	575	885	2,850	335	585	1,135	27·24

STE. ANNE DE LA POCATIÈRE.

EXPERIMENTAL STATION, CAP ROUGE, QUE.

REPORT OF THE SUPERINTENDENT, GUS A. LANGELIER.

DAIRY CATTLE.

The herd now comprises thirty-six head, thirty of which are pure bred and six grade French Canadians. There are three bulls—two aged and a calf—seventeen cows, fifteen heifers, and one heifer calf. These cattle are kept to supply milk to the dairy, for experimental breeding and feeding, and to sell stock at reasonable prices.

MILK PRODUCTION.

Eleven cows completed a lactation period during the year, that is between April 1, 1915, and March 31, 1916, and the following table gives details about them:—

RECORD OF DAIRY HERD, EXPERIMENTAL

Name of Cow.	Registration No.	Age at beginning of lactation period.	Date of dropping calf.	Number of days in lactation period.	Total pounds of milk per period.	Daily average yield of milk.	Average per cent fat in milk.	Pounds of butter produced in period.
				Days.	Lb.	Lb.	p.c.	Lb.
Kate	Grade		Oct. 22, 1914	513	8,502·50	16·57	4·17	417·56
Orange Blossom	886	8	Sept. 26, 1914	501	7,482·00	14·93	4·99	439·21
Colombelle	1,775	5	April 29, 1915	336	5,876·25	17·48	4·46	308·84
Armoricaine	2,616	10	Mar. 29, 1915	366	6,263·00	17·11	4·27	315·11
La Coulombe	1,938	6	Mar. 31, 1915	363	6,089·50	16·80	4·68	335·87
Princesse du Sable	2,261	4	Nov. 28, 1914	490	7,345·00	14·99	4·24	366·94
Empire	2,398	4	Nov. 18, 1914	470	6,321·50	13·45	4·59	341·66
Morlaisienne	2,617	9	Mar. 21, 1915	373	6,301·00	16·89	4·13	306·09
Championne de Berthier	2,366	3	April 20, 1915	343	5,721·00	16·67	3·72	250·83
Finette 2	218	10	July 13, 1915	260	5,724·00	22·01	3·62	243·78
La Brune du Sable	2,440	11	Feb. 23, 1915	402	4,273·75	10·63	4·63	232·98
Average	....	....	.....	401	6,354·50	15·84	4·32	323·53

Station, Cap Rouge, Que.

Value of butter at 28 cts. per lb.	Value of skim-milk at 20 cts. per cwt.	Total value of products.	Amount of meal eaten at 1½c. per lb.	Amount of roots and ensilage at $2 per ton.	Amount of hay at $7 per ton.	Amount of green feed at $3 per ton.	Amount of straw at 20 cts. per cwt.	Total cost of feed between calving.	Cost to produce 100 lbs. of milk.	Cost to produce 1 lb. of butter, skim-milk neglected.	Profit on 1 lb. of butter, skim-milk neglected.	Profit on cow between calvings, labour, manure and calf neglected.
$ cts.	$ cts.	$ cts.	Lb.	Lb.	Lb.	Lb.	Lb.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
116·91	16·29	133·20	1,936	26,956	4,007	1,870	89	68·39	0·80	0·16	0·12	64·81
112·97	14·21	137·18	2,957	24,731	4,038	2,860	74	80·26	1·07	0·18	0·10	56·92
86·47	11·22	97·69	1·622	15·277	2,344	995	21	45·29	0·77	0·14	0·14	52·40
88·23	11·99	100·22	1,924	14,720	2,231	829	77	47·97	0·76	0·15	0·13	52·25
94·03	11·60	105·63	2·337	16,049	2,437	884	19	55·15	0·95	0·16	0·12	50·48
102·74	14·06	116·80	2,455	23,756	3,353	995	86	67·83	0·92	0·18	0·10	48·97
95·66	12·06	107·72	2,066	23,677	3,337	1,050	86	62·92	0·99	0·18	0·10	44·80
85·70	12·08	97·78	1,654	20,554	2,885	1,106	23	53·02	0·84	0·17	0·11	44·76
70·23	11·01	81·24	2,083	14,529	2,252	884	19	49·80	0·87	0·19	0·09	31·44
68·25	11·02	79·27	1,994	14,412	2,192	995	86	48·66	0·85	0·19	0·09	30·61
65·23	8·15	73·38	1,383	18,512	2,737	995	86	47·04	1·10	0·20	0·08	26·34
90·58	12·15	102·74	2,037	19,379	2,898	1,224	60	56·94	0 89	0.17	0.11	45·80

Whilst these figures certainly are not phenomenal, they show a substantial profit over cost of feed, and if farmers of the district did as well—which is quite easy by feeding and weeding—the dairy industry would no doubt be a far more paying business.

EXPERIMENTAL BREEDING.

The grade cows which were bought to be bred to a French-Canadian bull have now all been sold to the butcher with the exception of one, after having been kept for two or more periods of lactation to know what they could do at the pail. A remarkable thing about these cows is that the heifer calves which they dropped at the Station from the service of scrub bulls before being bought were invariably poor milkers and had to be sold for beef. Their dams were purchased from nine different farmers, some of them better than the average, who asked rather stiff prices because their best were taken away. Now if these cows had been left in the herds where they came from, not only, with two exceptions, would they not have given enough milk to pay their board, but they would, in every case, have produced unprofitable progeny. No wonder that a great many people conclude that there is no money in dairying, when owners do not know what their cows are doing, and moreover breed them to scrub bulls.

The heifers out of these cows and by the Station's French-Canadian bull are bred back to their sire, as every one is strong, healthy, and shows no defect in common with him. It will be interesting to see how they will milk and what their progeny will be like.

EXPERIMENTAL FEEDING.

An experiment was begun in 1913 with dairy cows to find out the best quantities of meal to feed. All the cows which were each year nearly of the same weight and whose previous yearly record and date of calving placed them on about an equal footing, received exactly the same quantity of roughage—hay, ensilage, and swedes. One lot ate as much meal as they could clean out, which averaged one pound per 2·19 pounds of milk for the three years; a second lot received 1 pound of meal per 4 pounds of milk; and a third lot received 1 pound of meal per 8 pounds of milk. The experiment lasted five months each year, from the beginning of November to the end of March, and great care was taken in weighing out the feed, also in eliminating errors; for this purpose, sawdust was used for bedding so that no straw could be eaten, and partitions were put in the mangers so that no cow could steal anything from her neighbour.

The results of three years show that the animals which received the unlimited quantities of meal gave the most profit. The following figures give further details:—

BEST QUANTITIES OF CONCENTRATES FOR DAIRY COWS.

Unlimited ration (1 pound of meal per 2·19 pounds of milk).

Season.	Cost of Feed.	Value of Products.	Profit.	Gain or Loss in Weight.
1913-14..	$22 61	$38 45	$15 84	+ 17 pounds.
1914-15..	26 71	49 86	23 15	+ 10 "
1915-16..	23 97	32 80	8 83	+ 95 "
Total..	$73 29	$121 11	$47 82	+122 "
Average per cow per year ..	$24 43	$40 37	$15 94	+ 41 "

One pound of meal per 4 pounds of milk.

Season.	Cost of Feed.	Value of Products.	Profit.	Gain or Loss in Weight.
1913-14..	$14 54	$25 02	$10 48	+ 11 pounds.
1914-15..	21 90	46 01	24 11	— 50 "
1915-16..	15 97	25 74	9 78	+170 "
Total....	$52 41	$96 77	$44 37	+131 "
Average per cow per year.	$17 47	$32 26	$14 79	+ 44 "

One pound of meal per 8 pounds of milk.

Season.	Cost of Feed.	Value of Products.	Profit.	Gain or Loss in Weight.
1913-14..	$11 00	$20 79	$ 9 79	+ 38 pounds.
1914-15..	17 35	46 52	29 17	— 55 "
1915-16..	13 52	19 79	6 27	..
Total	$41 87	$87 10	$45 23	— 17 "
Average per cow per year.	$13 96	$29 03	$15 08	— 6 "

The food values were: meal, 1¼ cents per pound; roots and ensilage, $2 per ton; hay, $7 per ton. Butter was valued at 28 cents per pound and skim-milk at 20 cents per hundredweight. Labour, interest, depreciation, and manure were neglected.

The experiment will have to be continued a few years before definite conclusions can be reached, but to the present it tends to show that it pays to feed well.

COST OF FEED IN RAISING HEIFERS.

Experimental work done at many American and Canadian Stations during the last few years has shown that it costs more to raise a heifer, until she calves, than was at first expected. This will probably have a good effect in that farmers will do more weeding and keep only the animals which are out of good milking stock. In 1914-15, all food given to three heifer calves was weighed and it cost $24.30 to bring each of them to six months and ten days, when their average weight was over 360 pounds, which was very good for a small breed such as the French-Canadian. The food was calculated at the following prices: whole milk, $1.50 per cwt.; skim-milk, 20 cents per cwt.; meal, 1¼ cents per pound; hay, $7 per ton; roots, $2 per ton.

The food was all weighed during 1915-16 for these three heifer calves and the following table gives details since their birth:—

Cost of Feed in Raising Heifers.

Name.	Reg. No.	Date of Birth.	Weight-Lbs.				Age March 31, 1916.	Feed eaten-Lbs.						Cost.
			Birth.	6 Mos.	1 Year.	Mar. 31, 1916.		Whole milk.	Skim milk.	Meal.	Hay.	Roots.	Silage.	
Jeannette	3,490	Aug. 12, 1914	49	315	590	690	19 Months, 19 Days	1,098	8,344	540	1,849	4,897	4,209	55·48
Henriette	3,574	Sept. 26, 1914	76	377	667	745	18 " 4 "	1,065	7,941	467	1,788	4,861	3,769	52·58
Reine	Grade	Oct. 21, 1914	76	391	690	750	17 " 7 "	922	7,479	452	1,741	4,756	3,778	49·06
Average			67	361	649	728	18 " 10 "	1,028	7,921	486	1,793	4,838	3,919	52·39

The food valuations were as mentioned above.

In another year, the total cost of feed will be had for these three heifers which will then be of calving age.

This experiment will be continued for a few years more. During 1915-16, all food given to a heifer calf, Cassandre, was weighed with the result that it cost $28.32 to bring her to 11 months and 2 days when she weighed 525 pounds.

SELLING BREEDERS AT A REASONABLE PRICE.

There are now in the herd eleven French Canadian cows which have qualified for the Record of Performance, which is a larger number than that possessed by any individual, firm or public institution in Canada. Amongst the lot is the champion three year old of the breed. A splendid young bull, out of the highest producer of the herd, will be in service from the end of 1916, whilst the old bull, which is the sire of a dozen or so fine heifers, is acknowledged to be the most typical animal of the breed to-day, and he is out of a very heavy milker. It is more than probable that good cattle will be bred from such a good foundation. The most rigid weeding is done, and young breeding stock bought at this Station cannot help but improve the dairy stock of the district.

EXPERIMENTAL FARM, BRANDON, MAN.

REPORT OF THE SUPERINTENDENT, W. C. McKILLICAN, B.S.A.

DUAL-PURPOSE AND DAIRY CATTLE.

The breeding herd at Brandon Experimental Farm on March 31, 1916, consists of the following:—

Shorthorn: 2 bulls, 15 cows, 15 heifers and calves.
Ayrshire: 1 cow.
Grade: 2 cows and 1 heifer.

The herd is headed by the dual-purpose-type Shorthorn bull "Butterfly King 21st." This bull has been in use for several years and most of the younger stock are his offspring. He has given very satisfactory results as a sire. During the year a young bull "Robin Adair" was purchased from J. H. M. Parker, of Lennoxville, Que. This bull is got by the imported bull "Robin" from the famous "Tring" herd of milking Shorthorns owned by Lord Rothschild in England. His dam is "Octavia," a very fine dual-purpose cow with a good milking record. A half-brother of this young bull "Willowdale Robin" sold for $1,325, the highest price for a bull at the annual sale of the Milking Shorthorn Cattle Club of the United States at Cleveland, Ohio, on March 2, 1916.

The Shorthorn herd is composed chiefly of cows of milking strain and it is the object of the breeding and feeding operations to increase the milking propensities without sacrificing the beefing qualities. Some progress is being made along this line of improvement and the average milk production of the herd is increasing.

There is a great demand for dual purpose Shorthorns throughout the West, and were they available, many could be sold. No females have been sold for breeding purposes this year, as the object at present is to increase the herd. Six bull calves were sold to Western farmers. That number was all that was available, as the majority of the cows gave birth to heifers.

MILK RECORDS.

In the table which follows, are reported the milk records for all cows now on hand which finished a lactation period during the fiscal year ending March 31, 1916. In addition to the cows reported on, there are three heifers milking that have not finished their first period and four older cows that did not finish a lactation period during the year. Four old or unsatisfactory cows were sold during the year.

In estimating the cost of feeds, the following values are used:—

Meal (oats and bran)	per ton.	$20 00
Roots and ensilage	"	3 00
Hay (timothy, mixed hay and green oats)	"	10 00
Alfalfa hay	"	12 00
Straw	"	2 00
Pasture	per month	1 00

These prices are higher than the actual cost of growing these feeds, so that they allow a good profit to the field operations and compare favourably with prices obtainable were field crops to be sold.

The milk produced is valued at $1.50 per hundredweight. As a matter of fact, it was sold at from $1.75 to $2.25 per hundredweight. However, that is more than is obtained under average farm conditions in Manitoba and a fair average price is therefore used as a basis of calculation.

It will be observed that labour and interest on investment are not counted in this calculation, neither are the values of the calf at birth and the manure counted. It is simply a comparison between feed cost and milk production.

The feed a cow consumes from the time she dries off from milking at the end of one lactation period until the corresponding time after the next period, is charged against the production of the lactation period included in that time.

MILK RECORDS.

Name of Cow.	Age at beginning of lactation period.	Date of dropping calf.	No. of days in lactation period.	Total lbs. of milk for the period.	Daily average yield of milk.	Average per cent of fat in milk.	Pounds of fat produced in the period.	Value of whole milk at 1½ cts. per lb.	Amount of meal eaten at 1 cent per lb.	Amount of roots and ensilage eaten at $3 per ton.	Amount of hay eaten at $10 per ton.	Amount of straw eaten at $2 per ton.	Months on pasture at $1 per month.	Total cost of feed between calvings.	Cost to produce 100 pounds of milk.	Profit on cow between calvings, labour and calf neglected.
Ottawa Janet 4th S.	4	May 30, 1914	365	9,671	26·5	3·79	367	145·06	3,933	7,902	2,057	1,277	5½	68·41	70·7	76·65
Ottawa Marchioness 5th S.	7	May 7, 1915	298	8,452	28·4	3·68	311	126·78	2,732	8,955	1,717	942	5½	55·61	65·8	71·17
Ottawa Illuminata S.	3	July 30, 1914	356	7,905	22·2	3·8	300	118·57	3,087	6,462	1,756	1,203	5	55·54	70·3	63·03
Buttercup (Grade)	8	Nov. 10, 1914	447	9,024	20·2	4·0	361	135·36	3,499	12,080	2,508	1,629	9½	76·61	84·9	58·75
Dueless 3rd S.	8	Feb. 28, 1915	261	7,150½	27·5	4·1	294	107·56	2,853	8,947	1,921	590	8½	60·47	84·3	47·09
Brandon Hannah S.	3	Mar. 1, 1915	293	5,895	20·1	4·2	247	88·42	2,371	7,505	1,703	1,147	5½	49·96	84·7	38·46
Illuminata 5th S.	9	Feb. 22, 1915	218	4,778½	21·9	3·5	167	71·68	1,869	5,840	1,721	1,203	6½	43·59	91·2	28·09
Poppy of Brandon S.	7	April 8, 1915	299	4,778	16·0	3·77	180	71·67	2,058	8,805	1,787	1,049	5½	49·10	102·8	22·57
Brandon Beauty S.	6	June 24, 1915	256	4,270	16·7	3·55	151	64·05	1,821	9,740	1,852	1,063	5	48·14	112·7	15·91
Brandon Marchioness S.	3	May 18, 1915	314	3,847	12·2	3·68	142	57·70	2,188	8,520	1,877	426	5½	49·80	129·4	7·90
Jane of Brandon S.	8	Sept. 4, 1914	330	4,556	13·8	4·7	214	68·34	2,832	8,442	2,274	1,399	9½	63·08	138·4	5·26

COST OF RAISING HEIFERS.

The detailed feed records which are kept give data from which the cost of raising heifers under the conditions existing on this Farm can be ascertained. The three following statements are representative of the feeding done here during the past year and show the cost for the first, second, and third year of a heifer's life.

Brandon Irene—From Birth to 1 Year.

Born March 1, 1915; weight at birth, 65 pounds; weight, March 1, 1916, 580 pounds.

Feed consumed during the year:—

720	pounds	whole milk at 1½ cents per pound	$10 80
1,820	"	skim-milk at 20 cents per cwt.	3 64
950	"	corn silage at $3 per ton	1 42
683	"	roots at $3 per ton	1 02
140	"	straw at $2 per ton	0 14
441	"	alfalfa hay at $12 per ton	2 65
784	"	mixed hay at $10 per ton	3 92
987	"	grain at $20 per ton	9 87
		Total cost	$33 46

Pansy of Brandon—From 1 Year to 2 Years.

Born April 8, 1914; weight March 31, 1915, 634 pounds; weight March 31, 1916, 1,060 pounds.

Feed consumed during the year:—

3,485	pounds	corn silage at $3 per ton	$ 5 23
2,315	"	roots at $3 per ton	3 47
610	"	straw at $2 per ton	0 61
191	"	alfalfa hay at $12 per ton	1 15
1,000	"	green feed and mixed hay at $10 per ton	5 00
516	"	grain at $20 per ton	5 16
5⅓	months'	pasture at $1	5 33
		Total cost	$25 95

Brandon Marjory—From 2 Years to 3 Years.

Born March 28, 1913; weight March 31, 1915, 925 pounds; weight March 31, 1916, 1,160 pounds, dropped calf weighing 65 pounds at birth.

4,260	pounds	corn silage at $3 per ton	$ 6 39
2,675	"	roots at $3 per ton	4 01
756	"	straw at $2 per ton	0 76
2,040	"	green feed hay at $10 per ton	10 20
275	"	alfalfa hay at $12 per ton	1 65
168	"	grain at $20 per ton	1 68
5⅓	months'	pasture at $1	5 33
		Total cost	$30 02

RATIONS FOR DAIRY COWS.

Pasture was fairly abundant during most of the summer and there was little need for supplementary feeding. A light grain ration was fed the cows that were milking.

During the winter, corn silage and roots form an important part of the ration, being valued highly for their succulence. This year the corn crop was very light, and the quality below average, however, this difficulty was made up for by a large crop of

very fine mangels. The corn silage is mixed with cut straw and hay. This is fed morning and evening, the grain ration is fed on top of it and the roots fed at the same time. The alfalfa is fed long at mid-day. The grain ration during the past season has consisted of equal parts of chopped oats and bran. The following is the daily ration fed most of the time during the past winter:—

	Pounds.
Corn silage	30
Mangels	25
Oat and barley straw	6
Hay (green feed)	6
Alfalfa hay	5

Grain, 1 pound per 3½ pounds milk produced.

BRANDON.

EXPERIMENTAL FARM, INDIAN HEAD, SASK.

REPORT OF THE SUPERINTENDENT, W. H. GIBSON, B.S.A.

DUAL-PURPOSE CATTLE.

The breeding herd at the Indian Head Experimental Farm on March 31, 1916, consists of the following:—

Shorthorns—Two stock bulls, sixteen milch cows, nineteen heifers and calves.

Grades—One milch cow, one 2-year-old heifer.

Previous to 1914 the Shorthorn herd was handled purely from the standpoint of beef production. However, with a growing demand for dual-purpose cattle in Western Canada, it was decided to develop the milking qualities of the present herd. Many of the cows conform to beef types and have at times nursed their calves, which makes progress along the line of milk production somewhat slow. However, through the use of well-bred sires, strong hopes are held for the development of a dual-purpose herd.

During the year five young bulls were sold for breeding purposes. A great many more could have been sold had they been available.

Previous to April, 1915, complete records of the feed consumed by each cow were not kept, which accounts for not including in this report the cost of milk production at Indian Head. Many of the cows are making creditable records as may be seen in the accompanying table.

MILK RECORDS.

Name of Cow.	Date of calving.	Days in Milk.	Total milk for lactation period.	Average daily Yield.	Percentage fat in milk.	Total fat for lactation period.
Pride of Qu'Appelle 6th	Jan. 11, 1915	354	6,513·8	18·4	4·0	260·55
Prairie Red Rose 4th	Mar. 9, 1915	315	6,000·7	19·4	4·0	240·02
Rosebud	Feb. 20, 1915	314	4,712·3	15·0	3·8	179·06
Kate (grade)	May 7, 1915	269	4,477·1	16·6	4·1	183·56
Qu'Appelle Mayflower 6th	Feb. 20, 1915	345	3,909·2	11·6	4·29	167·70
White Rose	Feb. 10, 1915	250	2,919·0	11·6	4·1	119·67

EXPERIMENTAL STATION, LACOMBE, ALTA.

REPORT OF THE SUPERINTENDENT, G. H. HUTTON, B.S.A.

DAIRY CATTLE.

The herd of dairy cattle has made a creditable showing during the past year. There are now twenty-three pure-bred Holstein cattle in the herd, while six mature cows are now running in the Record of Performance test. The cow Lenore Del Burke Star has produced from the day of freshening, July 1, to March 31, 14,128·1 pounds of milk testing 3·1 per cent fat. The majority of the herd are freshening in the late summer and fall, but making allowance for this fact it can be stated that the whole herd, including a few fresh cows, is making a good showing as to butter production since the average test is 4·2 per cent.

While it is not intended to establish any special claim for the Holstein as a producer of beef as well as milk, it is of interest to record the fact that a pure-bred three-year-old heifer (L.E.S. Segis Echo) which proved a non-breeder was sold for beef during the present winter. She weighed 1,420 pounds alive, dressed 802 pounds of beef. The round, sirloin and rump cuts are shown in the accompanying plates.

The Jersey herd has not made any especially high records during the year, though the butter test from this herd averages high. This herd now numbers seven head with the bull Old Basing King George 5222 at the head of the herd. This son of Rosalind of Old Basing 1714 bred by C. A. J. Sharman of Red Deer, has developed into a large, strong constitutioned, long-ribbed bull, and should prove a valuable asset to the herd.

Little progress can be recorded in the work of grading up the common herd by the use of a pure-bred sire of high producing pedigree. It is unfortunate that all of the calves produced from this herd during the past year have been bulls. The only development in this direction during the past year has been the growth of the heifers born previously and which have now been bred. Since one of these is out of the cow whose record for two complete lactation periods has been 3,087 and 3,011 pounds, it will be of interest to note the work of her progeny when she begins her first lactation period.

LACTATION RECORDS FOR THE YEAR.

We submit herewith a record of the cows which have completed a lactation period during the twelve months ending March 31, 1916:—

Name of Cow.	Date of dropping calf.	No. of days in milk.	Total amount of milk for period.	Average daily yield of milk.	Average per cent fat in milk.	Pounds of fat for period.	Amount of meal eaten at 1 cent per pound.	Amount of roots and ensilage eaten at $3 per ton.	Amount of hay eaten at $10 per ton.	Amount of green feed eaten at $10 per ton.	Amount of straw eaten at 10 cts. per cwt.	Months on pasture at $1 per month.	Total cost of feed for period.	Value of product, butter at 30c. per pound, skim-milk at 20c. per cwt.	Profit on product.	Cost to produce 100 pounds milk.	Cost to produce 1 pound of butter.
		dys.	lb.	lb.	%	lb.	lb.	lb.	lb.	lb.	lb.	mos.	$ cts.	$ cts.	$ cts.	cts.	cts.
Brampton Wolseley Girl	Sept. 18, 1914	319	4,899·3	15·4	5·6	275·4	1,642	4,850	1,756	1,362	1,438	6·5	47 21	112 51	65 30	96·3	13·7
Thelma's Gem	Apr. 26, 1915	292	4,940·6	16·9	5·17	240·8	2,102	3,300	2,510	546	1,825	5·25	48 30	99 70	51 40	97·0	16·0
Daisy Johanna Ormsby	Oct. 29, 1914	343	10,605·0	30·9	3·4	360·6	4,263	4,900	2,658	2,104	1,656	4·5	79 94	155 70	75 76	75·3	17·7
Lawncrest Lee Beets	May 5, 1914	338	13,824·2	40·9	3·1	428·5	4,138	4,900	2,531	2,008	1,931	5·0	78 80	187 47	108 67	57·0	14·7
Lenore Del Burke Star	Mar. 23, 1914	381	10,091·1	26·4	3·4	343·1	3,155	8,790	4,060	1,927	1,340	5·5	81 51	148 13	66 62	80·7	19·0
Maud Sarcastic	Feb. 21, 1915	297	10,683·0	35·9	3·58	382·5	3,258	7,230	3,755	1,166	1,310	5·5	77 89	164 03	82 14	72·9	16·3
Rhoda de Kol Beets	Sept. 10, 1914	269	7,364·2	27·4	2·84	209·1	1,908	4,764	1,388	1,644	1,714	1·0	55 52	92 73	37 21	75·4	21·2
Vrouka B. 3rd	Aug. 13, 1914	335	7,914·5	23·6	3·49	276·2	2,427	9,570	4,595	2,038	1,002	4·5	77 23	118 83	41 60	97·5	22·3
Princess Margaret Helbon	May 14, 1914	684	12,922·4	18·9	3·2	413·5	4,228	9,820	4,430	4,028	2,140	5·0	106 44	180 09	73 65	82·3	20·6
Grade Holstein No. 11	Dec. 7, 1913	594	13,319·5	22·4	3·7	492·8	4,288	9,340	4,680	1,254	2,340	6·0	94 90	210 45	115 55	71·2	15·4
Grade Holstein No. 12	Dec. 11, 1913	499	13,635·8	27·3	4·2	572·7	4,196	8,420	4,750	2,120	1,840	6·0	96 78	240 86	144 08	70·9	13·5
Grade Holstein No. 13	Mar. 31, 1914	403	8,430·2	20·9	3·8	320·3	2,520	6,870	4,236	3,172	1,460	5·0	79 00	136 22	57 22	93·7	19·7
Grade Holstein No. 14	Jan. 12, 1914	478	10,361·4	21·6	3·4	352·2	2,978	5,340	4,357	972	1,309	5·0	70 73	152 06	81 33	68·2	16·0
Grade Holstein No. 15	Dec. 22, 1913	517	11,997·6	23·2	3·9	467·9	3,578	7,420	4,594	3,680	1,870	6·5	94 70	198 49	103 79	79·2	16·2
Grade Holstein No. 17	Dec. 11, 1913	569	10,201·2	18·0	4·4	448·8	3,094	6,614	2,830	1,840	1,648	7·0	72 85	187 80	114 95	71·4	13·0
Grade Holstein No. 18	Dec. 1, 1914	448	8,066·7	18·0	3·7	298·4	2,667	4,243	3,268	2,065	1,749	5·33	66 70	127 44	60 74	82·7	17·9
Grade Holstein No. 19	Feb. 4, 1914	457	8,276·1	18·1	3·4	281·3	2,614	5,314	3,452	2,908	1,751	5·0	72 66	121 46	48 80	87·8	20·6
Grade Holstein No. 20	Mar. 17, 1914	533	13,528·2	25·3	3·7	500·5	4,056	8,710	4,508	2,378	1,954	8·0	97 90	213 75	115 85	72·3	15·6
Grade No. 1	Jan. 13, 1915	325	7,305·8	22·4	3·6	263·0	2,158	2,534	2,366	1,395	1,531	5·33	50 95	112 69	61 74	69·7	15·5
Grade No. 7	Mar. 2, 1914	573	12,506·4	21·8	3·9	487·7	3,789	8,120	3,110	2,548	1,341	10·0	90 70	206 91	116 21	72·5	14·8
Grade No. 30	July 17, 1914	579	9,810·6	17·0	4·3	421·8	2,940	6,420	3,556	2,110	1,460	7·5	76 32	176 93	100 61	77·7	14·5
Grade No. 31	May 2, 1914	383	4,988·8	13·0	3·6	179·5	1,815	7,800	2,786	2,210		6·0	60 83	76 93	16 10	121·0	27·1
Grade No. 34	Dec. 27, 1913	613	10,272·2	16·7	5·2	534·1	3,125	7,840	4,348	2,573	1,848	9·0	88 45	219 75	131 30	86·1	13·2

FEEDING TRIALS OF DAIRY CATTLE.

With the object of again comparing the relative values of different bulky fodders for dairy cattle, feeding trials were carried on during the past winter. The herd of cattle included all those not running in the Record of Performance test. The test was made on the following basis:—

(1) Roots and timothy, 1 pound of roots to 1 pound of milk, together with what hay the cattle will consume in one hour after feeding, plus all the oat straw they will eat at noon.

vs.

(2) Peas and oats silage, all the cattle will eat up clean in thirty minutes after being fed and all the oat straw they will eat at noon.

vs.

(3) Peas and oat silage, three-quarters of the weight of the ration and green sheaves one-quarter of the weight of the ration, all of the cattle will eat in one hour together with all the oat straw they will eat at noon.

vs.

(4) Peas and oats silage, three-quarters of the weight of the ration and prairie hay one-quarter of the weight of the ration, all the cattle will eat in one hour, also what oat straw they will eat at noon.

vs.

(5) Peas and oats silage, three-quarters of the weight of the ration and timothy hay one-quarter of the weight of the ration, all the cattle will eat in one hour after being fed and also all the oat straw they will eat at noon.

It is somewhat significant that the cost of a pound of butter produced when peas and oats silage is fed was exactly the same this year as in 1914. Other fodders showed some variations, but on the other hand there has been a variation in the method of feeding. In 1914 silage was not fed in conjunction with any other bulky fodder, whereas silage this year was used in various combinations. The trials indicate (as they did in the previous year) the advantage to the dairyman of having silage as a bulky fodder for cattle in reducing the cost of production, apart from the fact that the handling of a herd when fed on silage is accomplished with less labour than with other bulky fodders. From the experience of the past two seasons we believe that dairymen all over the province will find the silo worth while. It is true that the silage freezes during the extreme winter weather, but it is taken out of the silo with a pick and the freezing does not appear to affect injuriously the feeding value of the silage. Since the yield of peas and oats per acre when the oats are cut in the late milk or early dough stage will run from eight to twelve tons green weight, the amount of feed produced per acre is considerable and will compare favourably even with corn, particularly when the average of the tests indicates that the cost of producing a pound of butter with corn silage such as we can produce is more than twenty per cent greater than with silage made from peas and oats.

LACOMBE.

The table submitted herewith bearing on this subject gives the results in detail:—

	Roots and timothy.	Peas and oats silage.	Peas and oats silage and green sheaves.	Peas and oats silage and prairie hay.	Peas and oats silage and timothy hay.
Number of cows in experiment	20	20	20	16	19
Average weight at commencement of experiment	1,172·7	1,142·0	1,129·5	1,116·2	1,125·8
Average weight at finish of experiment	1,191·5	1,193·5	1,136·5	1,115·6	1,155·2
Average gain or loss in weight	18·8	51·5	7·0	—·6	29·4
Number of pounds of milk produced	2,687·6	2,047·8	1,999·1	1,856·5	1,963·4
Average milk per cow per day	19·2	14·6	14·3	16·5	14·78
Average per cent of fat in milk	3·845	4·07	4·32	4·17	4·05
Total pounds of fat produced	98·0	79·2	80·67	73·38	77·33
Average fat per cow per day	·7	·566	·576	·655	·581
Total meal consumed	982	738	675	602	661
Total turnips consumed	2,995	.....	.....	.....	.....
Total straw consumed	357	968	532	315	511
Total timothy consumed	1,900	.....	.....	.....	1,554
Total pea and oat silage consumed	.....	5,488	4,872	3,906	4,662
Total green sheaves consumed	.....	.....	1,624	.....	.....
Total prairie hay consumed	.....	.....	.....	1,302	.....
Meal mixture consumed per 100 lbs. milk produced	36·5	36·0	33·9	32·4	33·7
Meal mixture consumed per 100 lbs. fat produced	1002·0	932·0	836·7	820·3	854·7
Cost of meal at 1 cent per pound	$ 9·82	$ 7·38	$ 6·75	$ 6·02	$ 6·61
Cost of turnips at $3 per ton	4·49	.....	.....	.....	.....
Cost of straw at $2 per ton	·36	·97	·53	·31	·51
Cost of hay at $10 per ton	9·50	.....	.....	6·51	7·77
Cost of silage at $3 per ton	.....	8·23	7·30	5·86	6·99
Cost of green sheaves at $10 per ton	.....	.....	8·12	.....	.....
Total cost of feed	24·17	16·58	22·70	18·70	21·88
Cost to produce 100 pounds of milk	·899	·809	1·135	1·007	1·114
Cost to produce 100 pounds of fat	24·66	20·93	28·14	25·48	28·29
Cost to produce 1 pound of fat	·24	·209	·28	·25	·28
Cost to produce 1 pound of butter	·197	·167	·225	·204	·226

DAIRY PRODUCTS.

Cream has been sold to one of the largest Calgary creameries during the greater part of the last year, the price received at present being 36 cents per pound of fat, f.o.b. Lacombe, while the skim-milk has been used for young stock, being valued at 20 cents per hundred pounds. The manufacture of cream and Coulommier cheese having been started in both Calgary and Edmonton, it was considered inadvisable to continue the production of these cheese. The manufacture of cheddar cheese has been begun during the month of March and it is hoped that there will be a demand for ten pound cheese of this class from city markets as well as country towns. Our object in manufacturing cheese is to secure information as to the cost of the plant and the cost of operation of same and determine whether dairymen who are long distances from creameries or shipping centres might not find it to their advantage to put in an equipment for the making of cheddar cheese. It is believed that the wholesale market for these cheese will average 20 cents per pound and if this should prove the case the manufacture of this line of dairy product should certainly prove quite profitable.

EXPERIMENTAL FARM, AGASSIZ, B.C.

REPORT OF THE SUPERINTENDENT, P. H. MOORE, B.S.A.

DAIRY CATTLE.

Breeding has been continued as heretofore. There is now a first-class opportunity for culling and improving the herd because it has outgrown the cleared land of the Farm. During the first few years every heifer calf was raised regardless of the qualities of its dam, in order to get a herd together without buying; but now, calves need only be kept from the most promising cows.

The herd now numbers seventy--two head, of which twenty-two are pure bred Holstein-Friesian, and fifty grades of the same breed. The pure-breds are: one bull rising 5 years old, one bull 2 years old, three mature cows, five 2-year-old heifers in milk, one 2-year-old springing, three yearling heifers, eight heifer calves. The grades are nine aged cows, seven 3-year-olds, ten 2-year-olds, fourteen yearlings, and ten heifer calves.

The general health of the herd is excellent. During the year the tuberculin test has been applied twice to everything over three months of age, and no reactions were found, thus making the third year in succession that the herd has been absolutely free from this disease. The only mode for contagion at present is from visitors, and from cows coming for service to our bulls.

Of the cows which have finished a lactation period since March 31, 1915, 47·62 per cent have given heifers and 52·38 per cent have given bulls. The average for the past three years has been 55·2 per cent heifers.

Twenty-one lactation periods have been finished since last reporting. Most of these are for periods started late in 1914, and represent a period of feeding very high-priced concentrates. In nearly every case reported the cost of food per cow is higher than the average, and the profit correspondingly low. Some of the cows reported have been culled out since going dry.

In the following list, cow No. 87 is a pure-bred:—

Cow No.	Age.	No. days milked.	Total milk produced.	Average fat.	Total amount fat produced for period.	Total amount butter produced for period.	Total amount meal consumed	Total amount roots and silage consumed	Total amount hay consumed.	Total amount green food consumed.	Mos. on pasture.	Total cost of food for period.	Profit	Cost to produce 100 lb. milk.	Cost to produce 1 lb. fat.	Cost to produce 1 lb. butter.
No.	Yrs.	Days.	Lb.	%	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Mos.	$ cts.	$ cts.	cts.	cts.	cts.
87	5	347	15,556·8	3·34	519·89	649·86	5,837	32,802	2,259	.....	.....	129·28	165·95	83·7	24·86	19·88
31	2	452	10,247·4	3·2	328·27	410·33	2,343	15·744	2,485	.....	3·52	76·03	104·59	74·19	23·12	18·5
34	2	446	9,871·0	3·16	312·81	391·01	2,026	15·452	2,180	.....	4·17	70·78	101·56	71·7	23·5	18·8
17	15	339	11,523·0	3·02	348·59	435·73	4·314	24·187	960	1,900	1·46	104·40	95·73	90·6	27·	21·6
4	14	270	7,805·6	3·4	265·36	331·7	1,868	17,143	384	1,900	1·46	58·43	91·80	75·4	22·	17·6
39	2	398	8,224·0	3·61	297·54	371·92	2,088	18,185	2,345	1,900	2·46	76·10	91·16	92·5	25·57	20·46
16	12	291	7·873·6	3·2	252·12	315·15	1,909	15,109	1,406	1,900	1·46	55·16	88·55	70·	21·8	17·5
30	2	456	7,536·5	3·6	275·3	341·8	1,767	16,037	2,597	.....	3·52	68·87	86·00	91·3	25·	20·
75	7	378	9,090·8	3·22	293·16	366·45	3,237	18,703	2,927	.....	4·54	84·21	82·82	92·6	28·5	22·9
61	8	284	9,361·6	3·4	322·18	402·72	3,957	24,125	1,550	1,900	1·46	102·39	79·67	109·3	49·16	39·33
25	9	196	7,939·8	2·83	224·73	280·91	2,512	12,250	20	1,900	2·53	65·01	65·21	81·8	28·92	23·14
22	11	279	6,415·2	3·08	197·84	247·3	1,246	15,863	192	1,900	1·46	49·52	63·83	77·19	20·	25·
13	10	358	7·121,8	3·08	209·44	261·80	1,250	14,906	.....	.....	3·88	60·20	60·54	84·	29·9	23·9
32	2	386	5,990·8	3·56	213·44	266·80	1,665	14,633	2,066	1,900	1·70	61·13	59·05	102·	28·62	22·9
14	9	260	5,109·5	3·62	185·64	232·06	1,110	14,040	14	1,900	2·53	46·66	57·65	91·3	25·1	20·1
40	2	323	5,715·2	3·3	190·51	238·13	1,445	16,206	619	1,900	1·46	54·03	54·07	94·53	28·35	22·68
19	9	230	6,512·7	2·85	185·87	232·20	1,357	16,266	824	1,900	·96	55·17	52·12	84·7	29·67	23·7½
38	2	367	6,493·1	3·1	199·31	249·61	1,833	14,400	2,100	2,129	1·7	63·52	50·50	97·8	31·87	25·5
35	2	425	5,858·1	3·2	191·14	238·92	1,201	14,483	2,391	.....	3·41	57·26	47·66	97·7	29·62	23·7
6	11	300	5,610·5	3·09	173·79	217·23	1,559	15,147	2,158	1,920	1·96	62·06	37·42	110·4	35·6	28·5
41	2	316	4,492·0	3·84	172·57	215·71	1,456	18,011	1,294	1,900	1·46	60·11	36·28	133·0	34·82	27·86
Average.. 21 cows.	.....	338	7,828·1	3·26	255·21	319·06	2,189·5	17,318	1,475	1,277	2·24	69·54	74·86	88·8	27·2	21·76

According to the custom of the past few years there is taken from the lists, for the sake of comparison, the performance of the five most profitable cows and the five least profitable cows; also a comparison of the best and the poorest cow.

	Most profitable cow.	Least profitable cow.	Average 5 most profitable cows.	Average 5 least profitable cows.
Number of days lactation	347·	316·	370·8	327·6
Yield of milk Lb	15,556·8	4,492·	11,000·76	5,793·2
Yield of fat "	519·89	172·57	354·98	184·53
Cost of food $	129·28	60·11	87·78	59·62
Profit over food consumed "	165·95	36·28	111·92	44·79

STATEMENT for Four Years, Five Most Profitable versus Five Least Profitable Cows.

	Five most Profitable Cows.		Five Least Profitable Cows.	
	1912–15.	1915–16.	1912–15.	1915–16.
No. days in lactation	367·25	370·8	285·3	327·6
Total yield milk lb.	10,898·43	11,000·76	5,727·01	5,793·2
Total yield butter fat "	377·96	354·98	188·53	184·53
Total cost of food $	70·84	87·78	47·60	59·62
Profit over cost of food "	137·16	111·92	56·42	44·79

CONCERNING RECORDS.

There is considerable discussion at the present time regarding the food cost of making official records with pure bred cattle, and as there has been some of this work conducted during the past year, the following figures are given to illustrate the amount of food required for an ordinary performance of a junior 2-year-old heifer. She was born in September, 1913. To raise her until the following spring cost $22.46. She then ran to pasture until autumn. Her yearling winter cost $14.85, and she was on pasture until 2 years 1 month old. Her food from this time until freshening, at 2 years, 4 months, and 5 days, consisted of 1,331·12 pounds silage, 1,331·12 pounds roots, 822·75 pounds straw, and 765 pounds grain, costing $21.81. She was in good form but not fat. She gave birth to a heifer calf weighing 103 pounds. After freshening her ration was very small for a few days but gradually increased. It consisted largely of mangels, some silage and a small amount of mixed hay. She was fed and milked four times per twenty-four hours. Her grain was a mixture of wheat bran 100 pounds, ground oats 100 pounds, oil cake 100 pounds, corn meal 75 pounds, cottonseed meal 50 pounds, which cost $1.48 per 100 pounds. In addition she got 1 pound soja bean cake per day for some time. She was started on a few pounds of grain per day and gradually worked up to 14 pounds per day, and not at any time did she exceed this amount. To humour her peculiar taste at one time all silage had to be taken from her and all mangels fed. At this time for nine continuous days she ate 120 pounds per day, then wanted silage again. During her first eighty-three days she consumed 1,130 pounds of grain, 5,653·4 pounds mangels, 2,826·7 pounds of silage, 166 pounds hay at a cost of $30.56. In this period she produced 4,336·9 pounds of milk, and 150·5 pounds butter fat, or 188·12 pounds butter. Out of this period she made, official accepted records, in seven days 405·9 pounds milk and 17·18 pounds of butter, and in thirty days 1,656·1 pounds milk and 70·46 pounds butter. The sixty-day record is not accepted at time

AGASSIZ.

of writing. The heifer is being tested under the Record of Performance rules and very careful figures of her food are being kept for publication another year. The cost of such records does not appear to be beyond the reach of the ordinary dairyman who is breeding pure-bred stock and who is willing to give them the little extra care and attention.

COST OF RAISING PURE-BRED HOLSTEIN CALVES.

The following figures illustrate the method of feeding and the amounts of food used in raising pure bred Holstein calves to 7 months of age. As will be noted they were fed, at a reasonable cost, mostly on skim-milk, roughage, and grain, and the accompanying photograph illustrates their condition a few weeks after the trial was finished. On account of using less whole milk and more skim-milk, feeding three times per day, and a little good care, this cost is not nearly as heavy as in previous years.

Food Cost to Raise Dairy Calves.

	Food Consumed.					Cost.
	Whole Milk.	Skim-Milk.	Grain.	Hay.	Roots and Silage.	
	lb.	lb.	lb.	lb.	lb.	$
1st month	96	464	.....	.....	.....	2·60
2nd "	42	632·	12	2·	.....	2·40
3rd "	.....	630	45	10·	90	2·42
4th "	.....	651	46·5	10·	155	2·50
5th "	.....	651	62·	20	320	3·12
6th "	.....	609	58·	29·	435	3·18
7th "	.....	651	62·	31·	620	3·63
	138	4,288	285	103	1,620	19·65

Average weight at birth, 92 pounds.
Average weight at 7 months, 472 pounds.
Average gain for period, 380 pounds.
Average daily gain per calf, 1·78 pounds.
Cost per pound gain, 5·17 cents.
Skim-milk consumed per 100 pounds gain 1,126·3 pounds.
Whole milk consumed per 100 pounds gain, 36·3 pounds.
Grain consumed per 100 pounds gain, 75·0 pounds.
Hay consumed per 100 pounds gain, 27·1 pounds.
Silage and roots consumed per 100 pounds gain 426·3 pounds.

CALF REARING.

MILK SUBSTITUTES FEEDING TESTS.

This year an endeavour was made to repeat the 1914-15 work and to enlarge upon it. To get a sufficient number of calves all the bulls were kept and fed. On account of lack of accommodation it was impossible to continue the trials for six months. Thus the results given compare well with last season's work as far as duration is concerned and give figures relative to the first three months of the calf's life.

All calves were Holstein or grade Holstein. They were comfortably housed, well bedded, kept perfectly clean, fed four times per day when young and three times per day throughout the remainder of the time. They had roughage and grain as soon as they would eat it. Roughage consisted of equal parts, by weight, of corn silage and mangels. The grain mixture was made up of equal parts, by weight, wheat bran, ground oats, corn meal, and oil cake.

Whole milk was charged at $1.50 per 100 pounds, skim-milk at 25 cents per 100 pounds, oil cake at $1.70 per 100 pounds, Blatchford's calf meal $4 per 100 pounds, dry grain mixture, $1.47½ per 100 pounds, roughage, 15 cents per 100 pounds.

The following results were obtained:—

—		Lot 4. Whole milk.	Lot 5. Skim-milk.	Lot 6. Linseed oilcake.	Lot 7. Blatchford's Calf meal.
Weight at birth	lb.	99·	103·75	121·	115·
No. days on test	"	86·	98·5	86·	96·
Weight at finish	"	264·	263·	181·5	189·
Average gain per calf	"	165·	159·25	60·5	74·
Average daily gain per calf	"	1·91	1·61	·7	·77
Amount whole milk fed per calf	"	1,538·	271·	402·	117·
Amount skim-milk fed per calf	"	.....	1,416·33	.....	.....
Amount linseed oilmeal fed per calf	"	.....	.....	39·	.....
Amount Blatchford's calf meal fed per calf	"	.....	.....	.....	112·
Amount dry grain fed per calf	"	47·5	75·	70·5	54·5
Amount roughage fed per calf	"	15·	20·	60·	20·
Amount test food per 100 pounds gain	"	932·1	889·31	64·46	151·35
Amount dry grain per 100 pounds gain	"	28·7	47·09	116·5	73·6
Amount roughage per 100 pounds gain	"	9·1	12·5	99·1	27·02
Cost to produce 100 pounds gain	$	14·42	5·49	13·02	9·55

The results are very similar to those of last year. It would be expected that Lot 4 would make the largest gains and have the fattest, best looking calves at the highest priced gain. This was a fact, but in appearance they were very little better than lot 5, except for some extra fat which they carried. Although lot 7 made the cheapest gain of any milk substitute it produced cheap-looking calves that were not worth more than half as much as lot 5. Lot 6 produced calves that were mean, pot bellied, little things, and in the same class as lot 7.

In the general routine of calf-feeding work during the past year it has been observed that calves fed three and four times per day while young gave better returns than those fed only twice per day. Late in the winter a trial was made. Only four calves could be obtained from the herd. They were all fed in the same pen and given the same amount of grain and hay. The calves fed twice per day were given all the milk they could take, without scouring, which averaged about 12 pounds per day. The calves getting four feeds per day averaged nearly 16 pounds per day much more comfortably. The time necessary to heat and weigh the food, feed the calves and wash the pails, amounted to about four minutes per calf per meal. The following figures illustrate the standing of each calf:—

—		Average of calves fed twice per day.	Average of calves fed four times per day.
Weight at birth	lb.	94·5	108·
Weight at finish	"	164·5	209·
Total gain in weight	"	70·	101·
No. days on trial	dys.	60	68·
Average daily gain per calf	lb.	1·16	1·48
Cost of food for period	$	6·41	10·06
Cost to produce 1 pound gain	c.	9·02	9·9
Whole milk consumed per 1 pound gain	lb.	4·92	5·53
Skim-milk consumed per 1 pound gain	"	5·18	5·25
Grain consumed per 1 pound gain	"	2·85	1·89
Hay consumed per 1 pound gain	"	·14	·09

There is not any striking financial difference between the two lots, but there was a great difference in the appearance. The lot fed four times per day appeared to be worth twice as much as the other. Both lots remained in perfect health during the trial. A much more extensive trial is planned.

WINTERING SENIOR YEARLING GRADE HOLSTEIN HEIFERS IN OPEN SHEDS VERSUS STABLE.

The heifers used in this trial had run to pasture during the summer. The average of the bunch was just over 1 year and 7 months. They were in good growing condition, and no attempt was made to fatten them. They were all to be bred to freshen in the autumn of 1916. In the stable they were tied, bedded, occasionally groomed, allowed out for exercise when the weather permitted, and water was before them at all times. The lowest temperature in the stable was 35°, and only on two occasions did it drop to this low mark.

In the shed the heifers were loose, fairly well bedded, never groomed, allowed out at all times, and got water from a tub in the yard. The building was open to the south, and the rest was not exceptionally tight. The lowest temperature was 1° below zero. Snow drifted in badly, but the shed was kept reasonably dry.

This trial has just been made for one winter and there has not yet been an opportunity to study the summer after-effects on the heifers.

The winter through which this trial was made was one of the longest and most severe ever experienced in the district. Consequently the results obtained in the open sheds may not be as favourable as could be expected during an ordinary winter.

Both lots of heifers were fed twice a day. The roughage consisted of mangels 4·25 parts, silage 4·25 parts, and 1·5 parts straw, by weight. The grain was one part wheat bran, and two parts oilcake, by weight. They got all the roughage that they would clean up and from 2 to 3 pounds of grain per day per animal, starting with 2 pounds and finishing with 3 pounds daily.

The heifers in the stable had smooth short coats and increased considerably in flesh as well as in size. The ones in the shed grew very long thick coats, and although they grew well did not increase much in flesh. All the heifers were bred, and two in each lot returned once. The following figures best illustrate their performance:—

		Lot 1. Sheds.	Lot 2. Stable.
Date started		Nov. 1, 1915	Nov. 1, 1915
Date completed		Mar. 31, 1916	Mar. 31, 1916
No. days wintering		152	152
Average age at beginning		1 yr. 7·3 mos.	1 yr. 7·2 mos.
Weight at beginning	lb.	4220·	4240·
Average weight at beginning per heifer	"	844·	848·
Weight at finish	"	4510·	4700·
Average weight at finish per heifer	"	902·	940·
Total gain	"	290·	460·
Average gain per heifer	"	58·	92·
Daily gain per heifer	"	·38	·6
Silage per pound gain	"	50·94	28·6
Mangels per pound gain	"	50·94	28·6
Straw per pound gain	"	17·98	10·12
Bran per pound gain	"	2·27	1·43
Oilcake per pound gain	"	4·54	2·86
Food cost per pound gain	cts.	27·9	16·4
Food cost to winter each heifer	$	16·21	15·07
Interest on housing each animal (10% depreciation on buildings)	$	2·00	10·00
Food and housing cost per heifer	$	18·21	25·07

DAIRY COW FEEDING EXPERIMENTS.

Conditions in the herd and with the men were most favourable for experimental work during the past winter season. The herdsman, Herbert Wade, was untiring in his efforts to keep everything in good condition, in weighing and keeping trace of all foods fed, and in the general oversight of the herd. In this he was ably assisted by his his two co-workers, Robert Mackie and Thomas Williamson.

The feed mixing and weighing room proved too small to be convenient. This, coupled with the extremely cold winter, were the two big drawbacks encountered.

Four tests were conducted with the cows relative to milk and butter production.

First.—Corn Silage vs. Clover Silage.

Second.—Straw vs. Mixed Hay, in combination with Mangels and Silage.

Third.—Mangels vs. Carrots, in combination with Silage and Straw.

Fourth.—Watering from Constant Supply in Bowls vs. Watering from Manger twice per day.

In the first test, corn or clover silage made up the bulk of the ration, but a small quantity of straw was fed. Both silage and straw were charged at $4 per ton. The grain was a mixture of ground oats and oilcake which cost $28 per ton.

Most of the cows used were 2-year-old heifers which freshened early in the autumn, the remainder being cows which freshened in the summer.

The following protocol illustrates the results obtained:—

Clover Silage versus Corn Silage.

		Clover Silage	Corn Silage.
		Periods 1 & 3 average.	Period 2.
No. of cows on test		14	14
Average milk produced per cow per day	lb.	30·45	30·07
Average per cent of fat in milk	"	2·9	3·
Average fat produced per cow per day	"	·8882	·9037
Grain consumed per pound fat produced	"	12·19	11·69
Grain consumed per 100 pounds milk produced	"	35·5	35·14
Silage consumed per pound fat produced	"	54·99	52·7
Silage consumed per 100 pounds milk produced	"	160·3	156·4
Straw consumed per pound fat produced	"	10·24	13·5
Straw consumed per 100 pounds milk produced	"	29·8	40·6
Dry matter consumed per pound fat produced	"	35·75	34·2
Dry matter consumed per 100 pounds milk produced	"	103·95	136·9
Nutritive ratio of ration		1 : 5·45	1 : 6·5
Cost to produce 1 pound fat	cts.	30·24	29·6
Cost to produce 1 pound butter	"	24·19	23·68
Cost to produce 100 pounds milk	"	87·74	88·61

From the above figures it will be noted that there is not enough difference between the two kinds of silage to give either an advantage. The quality of the clover was good, but the corn was excellent. The cows appeared to enjoy the corn the more. The results obtained are practically a repetition of those obtained last year. If clover silage is well made it is evidently a close rival to corn silage for milk and butter production, but if not put up properly it has no place in a dairy stable.

Mixed Hay versus Oat and Barley Straw.

The second trial was a test of the value of oat and barley straw as compared with mixed hay, fed in conjunction with corn silage and mangels for milk and butter production. The roughage ration was made up as follows, parts by weight:—

Straw or hay	1·5
Mangels	4·25
Corn silage	4·25

The grain ration fed along with this was made up of parts by weight:—

Crushed oats	2·
Wheat bran	2·
Linseed oil cake	1·

As the weather was very cold during this trial the roughage was weighed and mixed thirty-six hours before feeding, and it warmed up slightly. A very small portion of straw or hay, as the case may be, was fed dry once per day, but was not very greatly enjoyed by the cows, although it appeared to be necessary. Straw was valued at $4 and hay at $10 per ton.

The following figures are the results obtained:

MIXED Hay versus Oat and Barley Straw.

		Straw.	Hay.
		Periods 6b & 8 average.	Period 7
No. of cows on test		15·	15·
Average milk produced per cow per day	lb.	25·19	27·83
Average per cent of fat in milk	"	3·39	3·33
Average fat produced per cow per day	"	·854	·934
Grain consumed per pound fat produced	"	11·68	10·2
Grain consumed per 100 pounds milk produced	"	42·6	34·2
Silage and mangels consumed per pound fat produced	"	55·79	50·98
Silage and mangels consumed per 100 pounds milk produced	"	189·8	171·06
Straw consumed per pound fat produced	"	10·91	.....
Straw consumed per 100 pounds milk produced	"	37·1	.....
Hay consumed per pound fat produced	"	.....	9·97
Hay consumed per 100 pounds milk produced	"	.....	33·4
Dry matter consumed per pound fat produced	"	29·5	26·3
Dry matter consumed per 100 pounds milk produced	"	101·	88·5
Nutritive ratio of ration	"	1 : 6·52	1 : 6·33
Cost to produce 1 pound fat	cts.	27·11	27·21
Cost to produce 1 pound butter	"	21·69	21·77
Cost to produce 100 pounds of milk	"	95·65	91·26

Leaving out the item of price, the straw does not compare very favourably with hay, but when both prices are considered, there is one-tenth of a cent per pound fat in favour of the straw. In milk production there is 4·39 cents per 100 pounds in favour of hay. As far as the condition of the cattle could be judged by appearance and weight, there was not any noticeable difference. The cows liked the hay mixture better than the straw. Where straw can be grown or obtained cheaply it is certainly too valuable a food to be burned or allowed to rot in piles about the yards.

FIELD CARROTS VERSUS MANGELS.

A third trial was made with the idea of ascertaining the value of carrots as compared with the mangels when fed to dairy cows.

During the average season, on average land of the sandy loam type, larger crops (gross tons) of carrots than mangels can be grown. Many dairymen can grow carrots with less expense than they can mangels, on account of their greater cropping quality on poor land. Comparing them to turnips they are as easily grown and they are not troubled with the root maggot or the aphis, which in some sections make turnip or swede growing almost impossible. Carrots should be fed out before February 1.

The cattle do not enjoy the carrots as much as they do the mangels, but when they are mixed with silage and straw they feed equally well on either. This year, at least, there was not any noticeable carrot flavour detected in the milk, butter or cheese.

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The following comparison was obtained:—

MANGELS versus Carrots.

		Mangels. Period 4 and 6 Average.	Carrots. Period 5
No. of cows in test		14·0	14·0
Average milk produced per cow per day	lb.	27·13	26·96
Average per cent of fat in milk	"	3·23	3·16
Average fat produced per cow per day	"	0·879	0·853
Grain consumed per pound fat produced	"	12·03	12·3
Grain consumed per 100 pounds milk produced	"	38·22	37·4
Silage consumed per pound fat produced	"	26·86	27·76
Silage consumed per 100 pounds milk produced	"	87·07	84·4
Roots consumed per pound fat produced	"	26·86	27·76
Roots consumed per 100 pounds milk produced	"	87·07	84·4
Straw consumed per pound fat produced	"	11·1	10·8
Straw consumed per 100 pounds milk produced	"	34·05	33·03
Dry matter consumed per pound fat produced	"	29·43	31·1
Dry matter consumed per 100 pounds milk produced	"	95·6	94·6
Nutritive ratio of ration		1:6·4	1:6·9
Cost to produce 1 pound fat	cts.	27·1	27·7
Cost to produce 1 pound butter	"	21·68	22·16
Cost to produce 100 pounds of milk	"	86·6	84·5

WATERING COWS TWICE PER DAY FROM CONCRETE MANGERS *VERSUS* WATER *AD LIBITUM* FROM WATERING BOWLS.

When buying sanitary barn equipment at the present time the average dairyman is usually assured by the manufacturer or agent that if an automatic system is installed, the cows by their increased production of milk or butter will soon pay for the proposed expenditure. The time limit set for this repayment is occasionally made exceedingly short by the enthusiastic agent.

Referring to the Experimental Farms Report for 1914, vol. I, page 391, the following is stated concerning the water system installed in the stables here:—

> This past season water bowls were installed, one between every two cows. This improvement cost, including our own labour, $4.10 per cow. Watering from the concrete manger gave good results, considering that there was no money outlay, but the bowl system is an improvement and has none of the objections of the former system. Any protection the bowl system gives to the health of the cows, or any increase in milk flow or general condition, should pay for the cost of installation.

Until this season there was not an opportunity to make a thorough test of the two systems for direct comparison. Fourteen cows were used on the trial. All the cows were fed on the same kind of food and treated as nearly uniformly as it was possible to treat them. When watering from the manger twice per day it was done after feeding morning and evening. The water was left before the cows thirty minutes in the morning, but longer in the evening.

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The following figures were obtained as a result of the trial:—

		Water from Bowls.	Water from manger.
		Periods 8b and 10 average.	Period 9
No. of cows on test		14·0	14·0
Average milk produced per cow per day	lb.	23·6	24·38
Average per cent of fat in milk	"	3·47	3·36
Average fat produced per cow per day	"	0·819	0·818
Grain consumed per pound fat produced	"	11·58	11·77
Grain consumed per 100 pounds milk produced	"	41·39	39·54
Silage and mangels consumed per pound fat produced	"	57·83	57·87
Silage and mangels consumed per 100 pounds milk produced	"	200·82	194·3
Straw consumed per pound fat produced	"	11·30	11·31
Straw consumed per 100 pounds milk produced	"	39·28	37·99
Dry matter consumed per pound fat produced	"	30·16	30·18
Dry matter consumed per 100 pounds milk produced	"	104·72	101·35
Nutritive ratio of ration		1:6·62	1:6·62
Cost to produce 1 pound of fat	cts.	27·69	27·71
Cost to produce 1 pound butter	"	22·15	22·17
Cost to produce 100 pounds milk	"	96·85	93·10

From the figures collected it is very evident that solely from a production point of view one system has very little advantage over the other. The bowl system is more sanitary, if properly cared for, more convenient, takes less labour than does the manger system. It is an improvement well worth the cost, but if it has to be paid for by the extra butter production of the cows, it will take forty cows, producing 350 pounds fat per year, 58·5 years to pay for the system installed for them at a cost of installation quoted above.

This is only the results of one careful trial, and therefore is not absolutely conclusive. Another trial will be made as soon as an opportunity presents itself.

SUMMARY.

(1) From the evidence obtained from the experiments made during 1915-16, clover silage, if properly made, can be recommended as a valuable substitute for corn silage for milk and butter production.

(2) When oat or barley straw can be grown or obtained cheaply and used as complementary foods with silage and mangels it is an excellent form of roughage as compared to ordinary mixed hay.

(3) For those dairymen who cannot successfully grow mangels, or as a substitute for early winter feeding, field carrots, of the Improved Short White type, can be recommended to provide succulence for dairy cattle.

(4) The *ad libitum* system of watering dairy cattle has certain outstanding advantages over other systems, but not altogether from the point of increased production.

DAIRY WORK DURING 1915-16.

The dairy work this year has been greatly increased and carried to a much more successful conclusion. The new addition to the dairy has proved most beneficial and provided reasonable quarters for experimental work. The work is still in charge of Miss R. Keene, who has most capably conducted the dairy work for the past three years.

The work of the year has been varied. Some sweet cream has been sold; enough butter to supply some local demand has been made; a very large and increasing

number of milk samples has been tested for dairymen in the district; the regular herd testing of composite samples six times per month; official testing in 7, 30, and 60 days of all pure-bred heifers; a large amount of English Stilton cheesemaking, and a small amount of Camembert cheesemaking, made up the year's operations.

The most important work has been the making of the cheese, which has proved both practicable and profitable. On account of the past limited market only a small amount of Camembert cheese has been made, but on account of the difficulties experienced by importing from Europe, and the duty on the American product, the market for a good quality of Camembert is improving.

English Stilton.—Some experiments had already been made with the manufacture of this cheese during 1914. The work, however, was carried out under the old conditions, and since the addition of the new cheese rooms, there have been considerable developments. The experiments of 1914 indicated that the climatic conditions usual here could be regulated so as to render possible the manufacture of Stilton as made in England.

The new premises, particularly the making and curing rooms, have enabled us to correct to a large extent such points as were not suitable. The first of these, too great variation of temperature, has been overcome by the use of insulated walls in making and drying rooms, and by placing the cellar partly below ground. The temperature of the two former did not exceed 74° F., and that only on a few days in summer, and can be raised to any degree desired in the winter. The cellar averaged 60° F. in hot weather and 35° F. during the extreme cold. This latter temperature though theoretically too cold for Stilton did not appear to injure the product, but simply retarded the ripening process. Cheeses were in perfect market condition at the end of ten or eleven months, a longer period than that usually allowed for curing. It is probable that the low temperature contributed to this delay.

Under the old conditions, difficulty was experienced in preventing too much evaporation during dry weather. With the new building this trouble had disappeared, but during an exceptionally wet March the opposite extreme was touched, the cheese showed a tendency to retain too much moisture and become soft. This defect was overcome by an increase in the initial acidity of the milk, and by the use of any mechanical means which aided the escape of whey during the early stages.

The following method has been found satisfactory here: the quantities given make one full-sized Stilton: 160 pounds milk, testing about 3·5 per cent, 14 cc. rennet. The acidity in the milk at time of renneting is from 0·18 to 0·3, according to conditions. Making-room temperature, 70° F. to 75° F.; drying and curing room not exceeding 60° F., if possible, though a few degrees higher for a short time does not appear to injure a well made cheese. The time to produce a finished Stilton of this size has averaged nine months, at which age it weighs from 10 to 12 pounds.

The product made during the summer and autumn of 1915 is now selling in Vancouver at 36 cents per pound, a price equalling that of imported English Stilton.

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EXPERIMENTAL STATION, SIDNEY, B.C.

REPORT OF THE SUPERINTENDENT, LIONEL STEVENSON, B.S.A., M.S.

DAIRY CATTLE.

The dairy herd at this Station at the present time numbers but two head of Jersey cows, one of which was purchased in April, 1915, and one in March, 1916.

These cows were fed all the hay, straw, and roots they would consume and, in addition, received 1 pound of grain, composed of equal parts of ground oats and bran, for every 3 pounds of milk produced. This ration proved very satisfactory.

The following table represents the milk produced, feeds consumed and profit over feed for the grade Jersey cow purchased in 1915:—

Age of cow ..years.	4
Daily average yield of milk for year..pounds.	21·5
Total yield of milk.. "	7,870
Value of grain feed consumed ..$	39 40
" roughage consumed..."	48 60
" milk at 5 cents per quart..."	157 40
Profit.."	69 45

HORSES.

CENTRAL EXPERIMENTAL FARM, OTTAWA, ONT.

REPORT OF THE DOMINION ANIMAL HUSBANDMAN,

E. S. ARCHIBALD, B.A., B.S.A.

The horses on the Central Experimental Farm, as in previous years, have been maintained almost entirely for labour purposes. However, as previously reported, a start has been made in breeding work with Clydesdale mares. During the past fiscal year two mares proved to be in foal. The same difficulty encountered in the year previous was met, and unfortunately the same disastrous results followed. Both these mares overran their time several weeks, the foals coming very weak and dying within twenty-four hours. Since these mares were only in fair flesh and had been worked six days per week during pregnancy, this is a most peculiar case. Several mares were bred again during the past fiscal year, and better results are hoped for. Two imported Clydesdale mares purchased during the past year have dropped excellent filly foals which are most promising.

There are now on the Central Experimental Farm twenty-nine horses, made up as follows: Twenty-one heavy draught horses, four expressers, and four drivers. The twenty-one heavy draught horses are made up of four imported Clydesdale mares, two Canadian-bred Clydesdale mares, two grade Clydesdale mares, and thirteen grade Clydesdale geldings. The two filly foals are not included in the above numbers.

I regret to report the loss of an imported Clydesdale mare during the past year, due to flatulent colic. This was a very extreme and sudden case, and before any assistance could be given the animal had died from rupture of the diaphragm. In spite of this most regrettable and severe loss, it will be noted that the horses showed a credit balance during the past year.

Particular credit in the care and management of the horses is due to the farm foreman, Mr. D. D. Gray, who has the direct care of this class of stock, and also to the stableman, Mr. John Nevins, whose interest and untiring attention are shown in the condition of the horse in spite of the year's work being heavier than that of the season last reported.

HORSE-FEEDING EXPERIMENTS.

A series of experiments in the feeding of horses whole versus crushed grain has been conducted during the fall and winter months. Although a large number of horses were used in this trial, the results to date have been of a nature which allows no definite conclusions. This trial is being continued during the heavy work of spring and summer, and it is to be hoped that this question may be definitely settled during the coming fiscal year.

HORSE LABOUR.

The twenty-one draught mares and geldings are expected to do all the work not only on the 200-acre farm and the areas temporarily rented and operated with the farm proper, but, in addition, to supply the necessary labour to the Horticultural,

Cereal, Poultry, Agrostology, Botanical, and other Divisions. In addition, a large amount of hauling and cartage in connection with all the Divisions, as well as road-making, messenger service, and the like, takes up much of their time. An increasing amount of horse labour is necessary for some of the newer Divisions, such as Extension and Publicity, and exhibitions and the like. Following is a detailed statement of the horse labour for the past fiscal year.

During the year April 1, 1915, to March 31, 1916, the work done by horses kept in the stables was equivalent to 7,594 days work, distributed as follows:

	Days.
Live stock, hauling feed, milk, etc.	198½
Farm work (200-acre farm)	2,516½
Horticultural Division and lawns	1,040
Cereal Division	870½
Poultry Division	104½
Agrostology Division	39
Bulletins to and from offices	25
Botanical Division	194
Omnibus service and supervision of work	1,460
Care of roads on farm	601
Various, including hauling freight, sidewalks, etc.	545
Total	7,594

FEEDING THE WORK HORSES.

The feeding of the work horses was conducted along the same lines as in former years. Readers desirous of discovering the hours of feeding, varieties and quantities of feeds given, rates of feeding for different weights of horses, and the like, are referred to the report for the fiscal year ending March 31, 1914.

FINANCIAL STATEMENT FOR HORSES.

Below are submitted the inventories and returns for horses on the Central Experimental Farm during the year April 1, 1915, to March 31, 1916.

	April 1, 1915.		March 31, 1916.		Returns from labour.	Gross returns including increased value and labour and manure.
	No.	Value.	No.	Value.		
		$		$	$	$
Horses	26	9,375 00	29	10,775 00	5,315 80	6,915 80

Returns.

By increased value of horses	$1,400 00	
7,594 days' labour at 70 cents	5,315 80	
200 tons manure at $1	200 00	
Gross returns		$6,915 80

Expenditures.

To cost of feed and bedding	$2,805 00	
Purchases	2,500 00	
Labour, stableman	750 00	
Harness and repairs	451 32	
Gross expenditures		$6,506 32
Net credit balance for horses		$ 409 48

OTTAWA.

EXPERIMENTAL STATION, CHARLOTTETOWN, P.E.I.

REPORT OF THE SUPERINTENDENT, J. A. CLARK, B.S.A.

HORSES.

One grade Clydesdale mare was purchased in the spring of 1915. She gave birth to a horse colt on the 31st of July. Darling of Tauton gave us a splendid horse colt on the 6th of June. There are at present seven horses at the Station and two colts; one team pure-bred Clydesdale mares, one team of grade draught mares, one team of grade Clydesdales (a mare and a gelding), one general purpose gelding used for light work and driving, and the two colts above mentioned

Work Record.

	Hours.
Farm work	8,105
Horticulture	321
Roads	379
Hauling manure	2,409
Messenger service	1,428
Hauling building material	716

The horses are fed in single stalls. A tilting manger is used. The draught horses are fed about as follows, when engaged at heavy work: 12 pounds hay, 10 pounds oats, 2 pounds bran, per 1000 pounds live weight; and during light work, 13 pounds hay, 6 pounds oats and 3 pounds bran per day. On Saturday evening the feed of oats was reduced by 1 pound for each horse. The three feeds on Sunday were also reduced by one pound each. Carrots and turnips were fed regularly as needed. The horses have remained healthy. Owing to the amount of heavy hauling during the autumn and winter of 1915-16 and that two of the mares had raised foals and that a third one was carrying a foal, the experiment of cheap wintering of idle horses had to be suspended as we had no idle horses.

Cost of Raising Young Horses.

In calculating the cost of raising young horses only the feed given the colts was taken into account, nothing being allowed for feed or care of dam, stallion fees, labour, interest or housing; on the other hand no credit was allowed for manure. Every effort was made to develop the colts rapidly with such food as is available on the average farm. One foal was dropped June 6 and the other July 31, 1915. Both were horse colts. They were allowed to run with their mothers except during working hours until October 30, when they were weaned and put in a box stall together. The records are thus divided into two periods:

First.—From June 6 until October 30. The amount of feed eaten by the colts in addition to their mothers' milk was kept as carefully as possible. The mares occasionally may have been responsible for errors. The amount recorded was as follows:—

858	pounds	of hay at $10 per ton	$4 29
206	"	oats at $29 per ton	2 99
154½	"	bran at $23.90 per ton	1 84
40	"	turnips at $2 per ton	4
		Total cost for period	$9 16

Second.—The second period of feeding was from November 1, 1915, to March 31, 1916. During this period everything fed was weighed. During mild weather the colts were housed in the sheep shed with a paddock run outside. In the winter months they were housed in the main barn in a box stall. They were given the following quantities of food:—

2,791	pounds	of hay at $10 per ton	$13 96
915½	"	oats at $29 per ton	13 28
456	"	bran at $23.90 per ton	5 45
1,011	"	roots at $2 per ton	1 01
1,685	"	skim-milk at ⅛ cent per pound	3 37
28	"	oil cake at $42 per ton	59
		Total cost for second period	$37 66
		Total cost of feed for the two foals to March 31, 1916	46 82

These colts weighed, respectively, 120 and 140 pounds when three days old. When they were weaned on October 30, the oldest, a pure-bred Clydesdale, weighed 650 and the grade foal weighed 450 pounds; and on March 31, 1916, the first colt was 299 days old and weighed 870 pounds; the second was 244 days old and weighed 720 pounds.

The average cost of extra food per foal during the first period was 3⅓ cents per day, and the average cost per foal for food during the second period was 12⅔ cents per day.

EXPERIMENTAL FARM, NAPPAN, N.S.

REPORT OF THE SUPERINTENDENT, W. W. BAIRD, B.S.A.

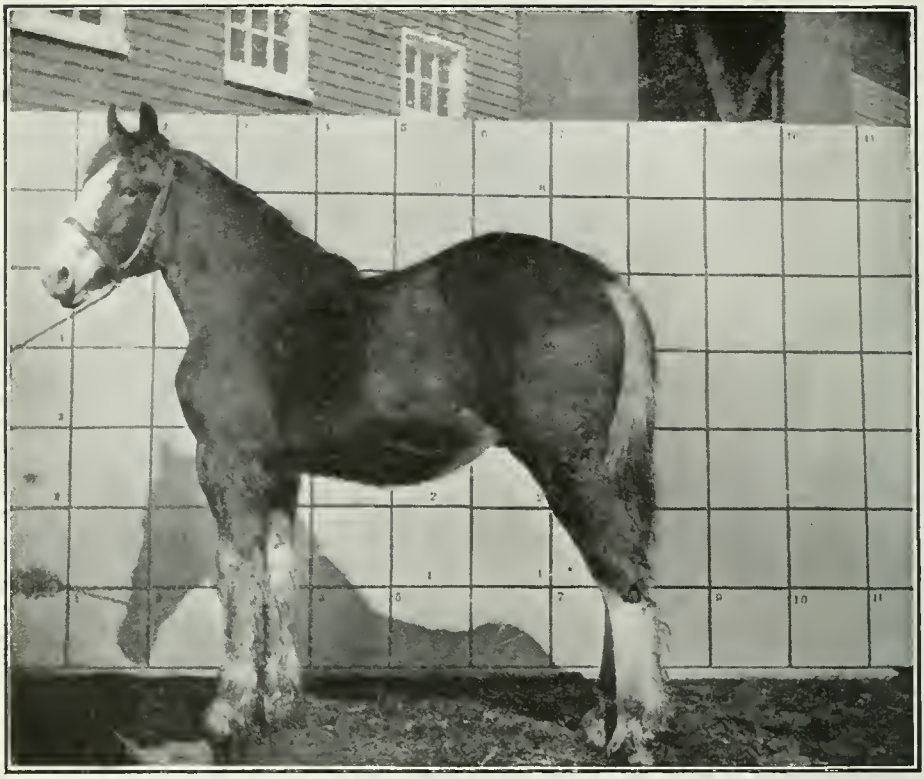
HORSES.

Eleven horses are kept at the Farm, including eight heavy draught horses which are used for all heavy work as well as miscellaneous trucking; three lighter ones which are used for the lighter work, such as cultivating, mowing lawns, light harrowing, express work and driving purposes. We regret to report that the two pure-bred Clydesdale mares did not prove in foal again this season.

All horses were kept busily engaged during the entire season when weather conditions were at all favourable; during the summer months on the farm, and in the winter they were in the woods, hauling wood and logs, also manure from the stables to the fields.

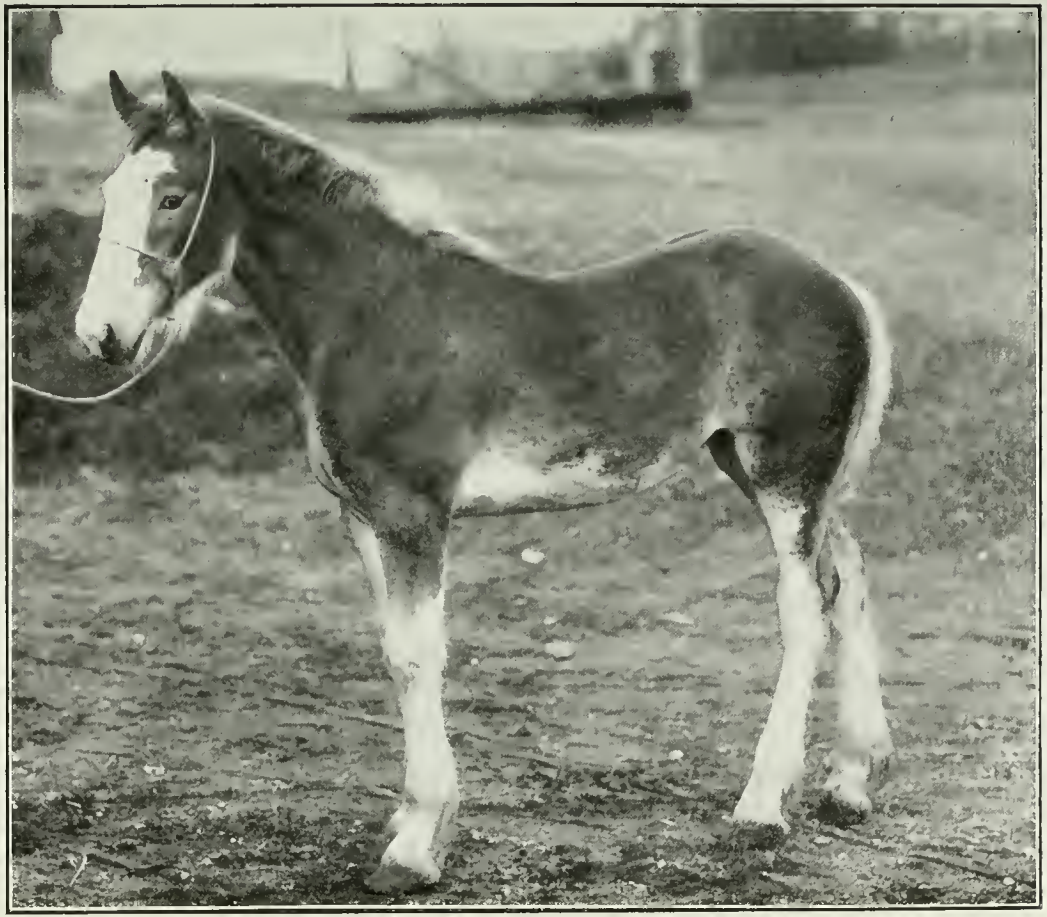
16—1916—3½.

Imported Clydesdale mares and foals, Central Experimental Farm, Ottawa.



An 8 months Clydes lale colt, Experimental Station, Charlottetown, P.E.I.

Horses wintering outside, winter of 1915-16, at Lacombe Station. Cost per head per day, 11·47 cts.



Brandon: Four-months-old colt born in early winter.

Brandon: Horses Wintering in Corral.

16—1916—34b.

Colts three years old raised on Scott Station.

Agassiz, B.C. The Force of Horses.

EXPERIMENTAL STATION, KENTVILLE, N.S.

REPORT OF THE SUPERINTENDENT, W. S. BLAIR.

HORSES.

Six medium heavy horses averaging 1,300 pounds, and two lighter driving and trucking horses are kept.

The driving and trucking horses are fed fairly uniformly throughout the year on a ration of 15 pounds grain and 12 pounds hay. The heavy horses are fed to the standard usually advised of 1½ pound grain mixture and 1 pound hay per 100 pounds live weight. The grain mixture usually fed is made up of 500 pounds crushed oats and 100 pounds of bran for summer feeding, and for winter 500 pounds crushed oats and 200 pounds bran. The object in crushing the oats is to destroy some of the weed seeds which the imported oats usually contain, and also because we very often find that some of the horses do not chew the whole oats thoroughly, with incomplete digestion resulting.

Oats have been unusually high during the past summer, and it has been found economical to substitute cracked corn for a part of the oats ration. It has also been found that the cracked corn in the crushed oat and bran mixture adds to the palatability, and that the horses on the whole like the mixture better and masticate it much more thoroughly than without the corn.

The ration during the summer has been 400 pounds crushed oats, 100 pounds cracked corn, and 100 pounds of bran. Oats averaged in price for the greater part of the summer about 75 cents per bushel, or $2.20 per hundred, cracked corn $2 per hundred, and bran cost on the average $1.60 per hundred during the summer. This mixture cost as follows:—

400	pounds	oats at $2.20 per cwt..	$ 8 80
100	"	cracked corn at $2 per cwt..	2 00
100	"	bran at $1.60 per cwt..	1 60
600	"	cost..	$12 40
Cost per hundred pounds..			$ 2·066
Hay cost per ton..			12.00

The grain fed to the six work horses from April 1 to December 1, eight working months, was 26,477 pounds, and the hay 19,004 pounds, an average of 18 pounds of grain mixture and 13 pounds of hay each per day. The cost of the summer feeding per day was as follows:—

18	pounds	grain mixture at 2·066 cents per pound.. .. .. cents.	37·18
13	"	hay mixture at 60 cents per cwt.. .. .. "	7·8
		Total cost per horse per day.. .. .. "	44·98

The horses were not in as good flesh in the fall as they should have been. They were kept steadily at work during the summer and it would seem that in order to keep horses working as these have worked more than the above amount of feed is required to keep them in good flesh.

It will be noticed that the hay ration is much lighter than that usually fed. No hay is fed at noon. The feeding system is as follows: one-third or slightly more of

the hay ration in the morning and one-third of the grain ration, at noon two-fifths of the grain ration, and at night the balance of the hay with the balance of the grain ration.

The ration for the four months, December 1 to April 1, has been changed somewhat. The cost of oats has materially lessened and the cracked corn ration has been reduced. The ration has been 500 pounds of oats, 200 pounds of bran, 50 pounds of cracked corn, and 50 pounds of oilmeal. Apparently by putting in even a small amount of cracked corn the horses chew the grain mixture better. The oilmeal was added to the mixture in order to get the horses in better shape. The above mixture cost as follows:—

500	pounds	oats at $1.55 per hundred	$ 7 75
200	"	bran at $1.20 per hundred	2 40
50	"	cracked corn at $1.80 per hundred	90
50	"	oilmeal at $2.20 per hundred	1 10
800	"	cost	$12 15
		Cost per hundred pounds	$1 52

The hay cost $12 per ton.

The grain fed to the 6 work horses from December 1 to April 1, the four winter months, was 11,690 pounds, and hay 8,928 pounds, an average of 16 pounds grain mixture and 12 pounds of hay per day. In addition, 5 pounds of carrots were fed to each horse per day at the evening meal. The grain and hay was fed in the same way as during the summer. The cost of the winter feeding per day was as follows:—

16	pounds	grain mixture at 1·52 cents per pound	cents. 24·32
12	"	hay at 60 cents per cwt	" 7·2
5	"	carrots at 20 cents per cwt	" 1·
		Total cost per horse per day	" 32·52

The horses have been working during the winter hauling hay, straw, manure, etc., and have steady, fairly heavy work, averaging five hours per day. They have built up considerably over their fall condition but have not the appearance of receiving more feed than they should have had to put them in proper condition. Probably had they been in better flesh in the fall less feed would have carried them through the winter in good condition.

The clearing and breaking work at this Station makes much heavy work and in addition, the farm being hilly means considerable heavy hauling at times, and it would seem that in order to keep the horses in good flesh during the summer the grain mixture should be increased to 20 pounds each per day.

EXPERIMENTAL STATION, FREDERICTON, N.B.

REPORT OF THE SUPERINTENDENT, W. W. HUBBARD.

HORSES.

Six pairs of horses were kept for the farm work. Of these three were pure-bred Clyde mares, five were grade Clyde mares, two were Percheron grade mares and two were geldings of draught breeding. Colts were raised from a pure-bred Clyde mare, a grade Clyde mare, and from the two grade Percheron mares. One of the Percheron colts was a horse colt, the rest were fillies. A grade Clyde mare had a breech presentation requiring the amputation of the hind legs of the colt. The mare was considerably exhausted and bruised and though under the care of a veterinarian she died on the third day after the operation. A grade Clyde mare 4 years old, weighing 1,550 pounds, was purchased to replace this loss.

The pregnant mares were worked steadily up to the time of foaling, and after a few days rest were put at light work again. The foals were kept in box stalls and for the first month the mares were brought to the barn and the foals allowed to suckle in the middle of each forenoon and afternoon. Care was taken that the mares should not be in an overheated condition when given access to their colts.

The colts each had a roomy box stall. A small grain box was put in as soon as they began to nibble at grain, and they were given crushed oats, bran, and a pinch of ground oilcake, beginning with a mere handful of the mixture and gradually increasing. They received water daily, and after weaning were watered three times each day and they took from 5 to 8 quarts at each drink. They were weaned at approximately 4 months old.

The costs of feed charged against them were as follows: Hay, $7 per ton; oats, 50 cents per bushel; bran, $22.50 per ton; oilmeal, $2 per 100 pounds; turnips, 5 cents per bushel.

Feed given to each of two Percheron grade foals, while suckling mare (4 months):—

Oats, 68 pounds	$1 00	
Bran, 50 pounds	56	
		$1 56
From September 1 to November 30 (3 months)—		
Oats, 1½ pounds per day—136 pounds	$2 00	
Bran, 1½ pounds per day—136 pounds	1 63	
Oilcake for period—10 pounds	20	
Hay, 4 pounds per day—364 pounds	1 27	
		5 10
From December 1 to March 31—		
Oats, 3 pounds per day—366 pounds	$7 38	
Bran, 3 pounds per day—366 pounds	4 46	
Oilcake for period—30 pounds	60	
Hay, 8½ pounds per day—1,037 pounds	3 63	
Turnips, 1½ pounds per day—3¾ bushels	19	
		16 26
		$22 92

These colts weighed on the 31st March as follows:—

Colt foaled April 24	pounds.	845
Filly foaled May 21	"	800

Two colts of Clydesdale breeding weighed on the same date as follows:—

Grade Clyde filly foaled May 4	pounds.	915
Pure-bred Clyde filly foaled May 6	"	820

The Clydes got 50 per cent more oats from December to March, and 1½ pounds hay per day more than the Percherons. They, therefore, cost for feed each till 31st March, $26.83.

A grade Clyde gelding and a grade Percheron filly, foaled April 29 and May 10, 1914, respectively, were treated the first year as above, and last summer were run on only fair pasture without any grain whatever from June 1 to October 31.

On April 1, 1915, the grade Clyde weighed 860 pounds. On March 31, 1916, he weighed 1,180 pounds. The grade Percheron on the same dates weighed 740 pounds and 1,165 pounds.

The cost of feeding for the year was as follows:—

Period, April 1 to May 31 (2 months)—	
Oats, 4½ pounds per day, 8 bushels	$4 00
Bran, 3 pounds per day, 183 pounds	2 04
Turnips, 2 pounds per day, 122 pounds	13
Hay, 10 pounds per day, 610 pounds	2 13
Period, June 1 to October 31—	
Pasture on wild land (5 months)	5 00
Period, November 1 to March 31 (5 months)—	
Oats, 4 pounds per day, 18 bushels	9 00
Bran, 3 pounds per day, 456 pounds	5 10
Turnips, 6 pounds per day, 18 bushels	90
Hay, 12 pounds per day, 1,824 pounds	6 38
Total	$34 68

Total food cost of grade colts up to 22 months of age (approximately 5⅓ cents per pound), $61.51.

The stallion's service fee in the case of the above colts was $10 each, and perhaps the colt should be charged with loss of time of mare, $10. This would make a total debit charge against the filly of $81.51.

The gelding has a castration charge additional against him of $5, making his debit charge $86.51.

Either one of these animals will sell quickly at $125.

With the exception of a few days rest for the brood mares at foaling, the horses all worked steadily from May 1 till December 1. From then on they worked from half to two-thirds of full time. The summer day was ten hours, the winter nine hours.

Cracked oats were fed with cut hay from May 1 till September 15, and for the first three months the cut hay was moistened with water sweetened with molasses. Approximately 12 pounds cracked oats and 1 pound molasses per day proved as nourishing as 16 pounds whole oats. The molasses cost 2 cents per pound. The oats cost 72 cents per bushel or 2·1 cents per pound. In this case there was a saving by the use of the cracked grain and molasses against the whole grain of 6 cents per horse per day.

It cost to feed and shoe the farm horses approximately $165 each for the year, and at 70 cents per day their earning power was $182.

The effect of a moistened ration, as described above, upon a driving mare that showed a good deal of distress in breathing, when fed long hay or allowed to eat her bedding, might be mentioned. This mare was said by many observers to have "the heaves" during the winter of 1914-15. After putting her upon a moistened ration of cut hay mixed with oats, bran, and a pinch of ground oilcake, and giving her sawdust for bedding, she has completely recovered and can road 12 miles an hour without showing any signs of distress or heaving.

FREDERICTON.

EXPERIMENTAL STATION, STE. ANNE DE LA POCATIERE, QUE.

REPORT OF THE SUPERINTENDENT, JOS. BEGIN.

HORSES.

Only a sufficient number of horses to do the farm work are kept on this Station; there is a registered lightweight Canadian mare, used for driving and garden work, and there are five teams of grade horses, weighing from 2,600 to 3,300 pounds, which do all the farm work and a very considerable amount of improvement work, such as clearing, drainage, clearing away stones, and gravelling roads.

ECONOMICAL WINTERING OF HORSES.

The experiment bearing on the economical wintering of a pair of draught horses, which was started during the winter of 1914-15, was resumed this year with the same pair of horses (an 8-year-old and a 9-year-old). The object of this experiment is to find out if it is possible to keep in good health and good condition horses that are not working or that are working very little during the winter season. The method of feeding was as follows: Each horse was weighed at the beginning of the experiment, on the 28th of October. The standard ration of hay and oats, mixed with 20 per cent of wheat bran, was reduced 1 pound per day and replaced by a pound of straw and a pound of roots per day, until each horse received the following ration: mixed hay, 1 pound; oat straw, 1 pound; and roots (swedes), 1 pound, per day per hundred pounds live weight. The horses showed a certain dislike to the straw and roots at first, but they got used fairly quickly to their new ration. The above mentioned ration was given three times a day, and what was left at the end of each day was carefully weighed. With the exception of a small quantity left during the first few days, almost the whole of the feed given was consumed during the winter months.

Last winter, under the same treatment, these horses had shown a light decrease in weight; this winter they recorded a small increase.

During the two years the horses did not exhibit any symptoms of digestive trouble or otherwise. They did a regular amount of work; one was carrying the mail and the other one was employed for the delivery of the milk to the customers. This experiment will be continued another year before conclusions are drawn.

EXPERIMENTAL STATION, CAP ROUGE, QUE.

REPORT OF THE SUPERINTENDENT, GUS. A. LANGELIER.

HORSES.

There are now twenty horses at the Station; fifteen registered French Canadians —eleven mares, a 2-year-old stallion, a yearling colt, two weanling fillies—also two teams of from 2,600 to 2,900 pounds, and a driver. They have all been and are now in very good condition. These horses are kept for work, experimental feeding and housing, and to sell high-class breeders at reasonable prices.

HORSE LABOUR.

Leaving out the unbroken colts and the horses which were kept idle for experimental purposes, the following figures show what the working animals were employed at during the year:—

	Hours.
Live stock, hauling feed, bedding, water	806
Poultry division	126
Bee Division	16
Farm work	11,719
Hauling manure from outside	3,717
Horticultural Division	1,411
Care of grounds and roads	1,999
Tobacco Division	2
Extension, publicity, exhibitions	176
Distribution of seeds, plants and trees	25
Clearing land	814
Draining	230
Fencing	180
Maintenance of equipment	220
Light, heat, power, and water	52
General supervision, messenger service, odd jobs	3,610
Buildings, construction and repairs	978
Total	26,081

This was an average of over 200 full days of ten hours per horse for the year. As there were seven brood mares and two 3-year-old fillies in the lot, the horses were fairly well employed all the time.

EXPERIMENTAL FEEDING OF HORSES.

This consisted in wintering horses cheaply, and in recording cost of feed of colts.

WINTERING A HORSE AT LOW COST.

A great many farmers, owing to the ever-increasing scarcity of help, have to depend more and more on machinery to perform the various farm operations which have to be done within a limited time in this district where the growing season is so short. To save manual labour means that machines must be large and run without losing time when the work which they are called to perform has to be done. This

requires the use of twice and often three or more times the number of horses in spring, summer, and autumn than are required in winter. A person who has a couple of good efficient teams does not like to buy at high prices at the beginning and sell at low figures at the end of the season, so that the question is to winter a number of the horses as cheaply as possible, whilst providing to have them in good shape to start the next year's work.

An experiment was started at this Station in 1911, and continued every winter since, and it is now conclusively proved that an idle horse can be wintered on a daily ration of 1 pound rough hay, 1 pound oat straw, and 1 pound roots (swedes or carrots) for each 100 pounds of his weight. By rough hay is meant hay made from any grass or weed which horses will eat, but not mouldy or musty stuff.

This experiment has been tried with young and old horses, mares and geldings, nervous and quiet beasts, and it can be depended upon as a good way to winter horses cheaply. The bulky ration, without grain, and with roots to keep the digestive tract in order, seems to be a good change from the somewhat large quantities of concentrates which it is necessary to feed to keep the animals in shape during the season of work. This has been shown by a gelding which suffered quite often from bad attacks of indigestion and which has not been troubled with them the year after he went through the experiment, though fed and used as before.

But it is well for any one who will try this way of feeding through the winter to remember that horses must be idle or practically so, doing only exceptionally easy work of very short duration; also that in the autumn they must be brought down gradually to the ration whilst work is decreased, and in the spring be brought up gradually to the heavy feeding whilst work is increased, each change taking at least a couple of weeks.

During the winter of 1915-16 two old animals were used for this experiment, a mare and a gelding, both eighteen years of age. The following tables show the quantities of feed eaten:—

FEED eaten during 152 days by an idle mare weighing 1,385 pounds.

Feed.	Quantity.	Price per ton.	Price per pound.	Cost.
	Pounds.	$	cts.	$ cts.
Rough hay	1,960	7 00	.....	6 86
Oat straw	2,018	4 00	.....	4 04
Swedes	2,014	2 00	.....	2 01
Oats	80	.....	1·5	1 20
Bran	40	.....	1·0	0 40
Total cost	.....	.....	.....	14 51

FEED eaten during 152 days by an idle gelding weighing 1,365 pounds.

Feed.	Quantity	Price per ton.	Price per pound.	Cost.
	Pounds.	$	cts.	$ cts.
Rough hay	1,960	7 00	.....	6 86
Oat straw	1,597	4 00	.....	3 19
Swedes	1,503	2 00	.....	1 50
Oats	80	.....	1·5	1 20
Bran	40	.....	1·0	0 40
Total cost	.....	.....	.....	13 15

The following table may be interesting as it gives the results of five years with six horses:—

COST of wintering idle horses—Summary of five years.

Winter.	Length of experiment.	Weight at beginning.	Weight at end.	Gain in weight.	Loss in weight.	Cost of feed.
	Days.	Pounds.	Pounds.	Pounds.	Pounds.	$ cts.
1911-12	152	1,375	1,395	20	.....	16 25
1912-13	151	1,350	1,445	95	.....	16 95
1913-14	151	1,150	1,135	.....	15	10 99
1914-15	151	1,055	1,100	45	.....	13 14
1915-16	152	1,385	1,410	25	.....	14 51
1915-16	152	1,365	1,370	5	.....	13 15
Average for five years	151	1,280	1,309	29	.....	14 16

From the above it will be seen that horses weighing from 1,055 to 1,305 pounds, or of an average weight of 1,280, can be fed during 151 days, if kept practically idle, for about 9½ cents per day, on a pound each of rough hay, oat straw, and carrots or swedes per hundred pounds live weight, when the above feeds are valued respectively at $7, $4 and $2 per ton.

COST OF FEED IN RAISING HORSES.

It is important for the farmer to know whether he can raise his horses at a lower cost than he can buy them. If certain parts of Canada offer such exceptional conditions that horses can profitably be raised there and sent to this district for less money than it would cost the farmer of central Quebec to raise them, then it is clear that the latter should buy his work animals. It is to throw some light on the subject that this experiment was started.

FEED OF A TWO-YEAR-OLD.

All feed given to a stallion dropped on May 31, 1913, was weighed, since he was weaned at five months of age, and the total cost, until April 1, 1915, was $90.69. During the following twelve months, he ate the following quantities of feed:—

5,114	pounds	hay at $7 per ton	$17 90
1,854	"	oats at 1½ cents per pound	27 81
1,841	"	bran at 1 cent per pound	18 41
61	"	wheat at 2 cents per pound	1 22
Pasture			4 97
			$70 31
Total cost when 34 months old			$161 00

It must be remembered that the above sum does not take into account the feed or care of dam, stallion fees, care of colt, interest, depreciation, or housing. But on the other hand, nothing was spared in feed to push the development of the colt to the utmost. The average weight of the sire and dam of this youngster is about 1,075 pounds, and he tipped the scales at 1,190 when 34 months old. He was never in the stable, being constantly outside, with only a single-boarded shed as shelter. He was broken when 2 years old and could, no doubt, from May, 1916, do enough work to pay for his board.

FEED OF A YEARLING.

Last year all feed given to a colt dropped on June 11, 1914, was weighed, and the total cost, until April 1, 1915, was $20.53. During the following twelve months this young stallion ate the following quantities of feed:—

2,984	pounds	hay at $7 per ton	$10 44
2,075	"	oats at 1½ cents per pound	31 13
1,821	"	bran at 1 cent per pound	18 21
			$59 78
Total cost when 21 months and 20 days old			$80 31

The colt weighed 725 pounds at the above-mentioned age, and as the average weight of his sire and dam is about 1,125, he promises to be at least 125 pounds heavier than they. He was never in the stable since born, being kept outside with only a single-boarded shed for shelter.

FEED OF TWO WEANLINGS.

These are two fillies, dropped respectively on June 10 and 28, 1915. Both were weaned when five months of age, and on March 31, 1916, they had eaten the following quantities of feed:—

2,644	pounds	hay at $7 per ton	$ 9 25
710	"	oats at 1½ cents per pound	10 65
1,380	"	bran at 1 cent per pound	13 80
87	"	whole milk at 1½ cents per pound	1 31
1,847	"	skim-milk at ½ cent per pound	3 69
			$38 70

These fillies, pure-bred French Canadians, weighed respectively 122 and 130 pounds at birth; at five months, when they were weaned, the first weighed 585 and the second 605 pounds; and on March 31, 1916, one was 295 days old and weighed 800 pounds, whilst the other was 277 days old and weighed 700 pounds. The greater weight of the younger at weaning may have been due to the superior milking qualities of the dam.

CAP ROUGE.

EXPERIMENTAL HOUSING OF HORSES.

During the four last winters, seven different colts have been kept outside with only single-boarded sheds as shelters, and with the temperature coming down as low as 31 degrees Fahrenheit below zero. One of these colts was dropped on July 31, and was weaned on December 31, both he and his dam remaining outside with above mentioned shelter. Not one of these youngsters ever even shivered, and no colds had to be treated. A stallion nearly 3 years old has been outside for three winters, on a hill which is exposed to all winds, and he is always in the best health. That he is vigorous is easily seen by the fact that when 26 months old he served five of the station mares, which were safely in foal to the first service.

That it takes a little more food thus to keep horses outside cannot be disputed, but this extra cost is certainly more than compensated by the continual good health of the "pure air" animals. This method, which was laughed at in this district at first—certain persons even threatened to report the Superintendent of the Station to the Society for Prevention of Cruelty to Animals—is now seriously considered by many, and has even been tried with success by one of the oldest and best known breeders of Berthier county.

SELLING HIGH CLASS BREEDERS AT A REASONABLE COST.

The stud of French Canadian horses at Cap Rouge Station is admitted to be the best in existence to-day. It is expected that about half a dozen colts and fillies can be raised every year and sold as breeders at a reasonable cost. The intention is to raise horses weighing between 1,200 and 1,300 pounds which will be tough, hardy, fast walkers, strong for their size and fairly good on the road. It is not expected that they will take the place of draughters or roadsters, but it is confidently believed that there is a place for them on the average small farm of this district, possibly of all Eastern Canada.

EXPERIMENTAL STATION, LENNOXVILLE, QUE.

REPORT OF THE SUPERINTENDENT, J. A. McCLARY.

HORSES.

There are now eighteen horses at this Station, made up of three imported registered Clydesdale mares, three Canadian-bred Clydesdale mares, nine well-graded Clydesdale work horses, one driving horse and one registered Clydesdale colt dropped September 1, 1914, which at the present time weighs 1,135 pounds. Five of these mares were bred in the summer and fall of 1915. Unfortunately one of these lost her foal, due to abortion. During the fall of 1915 one of the large work horses died from indigestion; with these exceptions the horses came through the year in excellent condition.

The grain ration consumed by the work horses consisted of a mixture of oats and bran, mixed in a proportion of five parts of oats to two of bran; the hay fed was mostly timothy with very little clover.

ECONOMICAL WINTERING OF IDLE HORSES.

It is a question of vital importance in this district to ascertain the methods by which idle horses may be kept most economically during the winter months when a great many farmers have not work for their horses, and must have them in good condition for the heavy spring work. For this reason it was deemed advisable to try an experiment with two pairs of brood mares during the winter of 1915 and 1916. One pair of these mares was fed 20 pounds of swedes and 27 pounds of hay each per day, while the other pair received 4 pounds of oats, 2 pounds of bran, and 27 pounds of hay each per day.

Below is a table giving the results of the experiment:—

	Pounds.
Weight of first pair of mares at beginning of experiment, December 22	3,029
" " " termination of experiment, March 31	3,205
Total gain per pair in 100 days	176
Cost of feed per day per horse—	**Cents.**
20 pounds of roots at 12 cents per bushel	4
27 " hay at $10 per ton	13½
Total cost per day per horse	17½
	Pounds.
Weight of second pair of mares at beginning of experiment, December 22	2,644
" " " termination of experiment, March 31	2,893
Total gain per pair in 100 days	249
Cost of feed per day per horse—	
4 pounds of oats at 50 cents per bushel	$0·058
2 " bran at $22 per ton	0·022
27 " hay at $10 per ton	0·135
Total cost per day per horse	$0·21½

These horses made satisfactory gains considering the feed consumed. It will be noted by the foregoing tables that the pair fed on hay and the light grain ration made a little larger gain than the pair fed on roots and hay, but considering the difference in the cost of feed consumed, it is recommended that the farmers of this district adopt the ration of roots and hay as a feed for the economical wintering of idle horses.

EXPERIMENTAL FARM, BRANDON, MAN.

REPORT OF THE SUPERINTENDENT, W. C. McKILLICAN, B.S.A.

HORSES.

The horses on this Farm consist of the following: two pure-bred Clydesdale mares, thirteen other heavy farm horses, two light horses for driving and two colts.

CLASSIFICATION OF LABOUR.

The following is the classification of the labour performed by the horses during the year. In the case of the two driving horses, whose time is reported as messenger service and Superintendent's driver, the whole time of the regular working hours of the year is reported rather than the hours actually spent driving. The mares raising colts are credited ordinary working hours for the time of work. The actual time spent on all other jobs is reported.

	Hours.
Field work	1,398
Experimental plot work	2,430
Horticulture and care of grounds	1,464
Drawing manure	1,627
" feed and bedding	1,773
Making and repairing roads	752
Teaming to and from town	1,600
Scavenger service and other chores	850
Building fences	268
" poultry house	215
Clearing land	161
Digging ditches	692
Mares raising colts	1,502
Messenger service	2,988
Superintendent's driver	2,988

COLTS.

Three colts were born during the year and two of them are alive and thriving on March 31. A pure-bred Clydesdale mare gave birth to a male colt on May 31. She had done her share of the work of seeding before foaling and worked on the binder again at harvest. The colt has done very well and weighs 1,110 pounds at 10 months. This mare has been bred again, and the younger Clydesdale mare has also been bred for the first time; both are in foal.

Two grade mares had been bred for winter colts. One foaled in December and the other in January. It was the intention to have them foal earlier, but they did not conceive when first bred. The first of these foals died of navel-ill when about three weeks old. The other one has been healthy right from birth and has grown well and seems to be equally as good a colt as a spring colt of the same age would be.

WINTERING HORSES OUTDOORS.

Seven working horses varying in age from 3 to 13 years, were wintered in a corral with only an open shed for shelter. Hay being scarce, they were given straw only for roughage, but had all of it they could eat. They were given 4 pounds of grain per day, their ration consisted of oats or barley and bran. They wintered quite well on this cheap ration. They did not fatten, but came in equally as fat as they were in the fall and in good health and mettle. Although the winter was an unusually extreme one, they did not appear to suffer any particular discomfort. The corral in which they were quartered is on a southern slope and is well protected from wind by trees and a high board fence.

EXPERIMENTAL FARM, INDIAN HEAD, SASK.

REPORT OF THE SUPERINTENDENT, W. H. GIBSON, B.S.A.

HORSES.

The horses at Indian Head Farm number nineteen head, consisting of five brood mares, six work mares, three geldings, three drivers, and two 2-year-old fillies. Previous to 1914 the horses were used solely for farm work. However, with the addition of three pure-bred Clyde mares, the work of horse breeding is receiving attention. Unfortunately, during the past year no colts were raised.

During the year experiments were conducted relating to the cost of keeping work horses from April 1, 1915, to March 31, 1916, the cost of wintering idle horses together with the cost of raising 2-year-old fillies.

Cost of carrying fourteen work horses from April 1, 1915, to March 31, 1916:—

Feed consumed—

62,286	pounds hay at $10 per ton	$ 311 43
38,886	" straw at $2 per ton	38 88
3,758	" bran at $20 per ton	37 58
50,197	" out-chop at $30 per ton	752 95
188	" flax at $40 per ton	3 76
Two months' pasture at $1 per month		28 00
Total cost for 365 days		$1,172 60
Average cost per horse for 365 days		$83 75

COST OF WINTERING HORSES.

The cost of wintering idle horses is always one of interest to western farmers. In this experiment fourteen horses were used and divided as follows:—

Lot I.—Turned out daily and allowed the freedom of a straw stack during the day. Stabled at night.

Number of horses in experiment		5
" days in experiment		91
4,550	pounds straw at $2 per ton	$ 4 55
335	" bran at $20 per ton	3 35
1,050	" oat-chop at $30 per ton	15 75
Total cost		$23 65
Average cost per horse per day	..cents.	5½

Lot II.—Kept in stable and allowed sufficient daily exercise to keep in good shape.

Number of horses in experiment		5
" days in experiment		91
3,020	pounds hay at $10 per ton	$15 10
5,170	" straw at $2 per ton	5 17
845	" bran at $20 per ton	8 45
1,345	" oat-chop at $30 per ton	20 17
Total cost		$48 89
Average cost per horse per day	..cents.	10¾

NOTE.—The entire group consisted of brood mares, three of which were in foal.

Lot III.—Light winter work such as hauling feed, straw, manure, etc.

Number of horses in experiment		4
" days in experiment		91
5,576 pounds hay at $10 per ton	$27	88
2,184 " straw at $2 per ton	2	18
232 " bran at $20 per ton	2	32
4,368 " oat-crop at $30 per ton	65	52
Total cost	$97	90
Average cost per horse per day..cents.		26¾

Cost of raising two Clyde fillies from 1 year to 2 years old.

Cost of Feed—		
2,792 pounds hay at $10 per ton	$13	96
1,548 " straw at $2 per ton	1	54
382 " bran at $20 per ton	3	82
594 " oats at 1½ cents per pound	8	91
Four months' pasture at $1 per month	8	00
Total cost	$36	23
Average cost	$18	11

NOTE.—These colts were turned out in the paddock daily for exercise, stabled at night.

EXPERIMENTAL STATION, SCOTT, SASK.

REPORT OF THE ACTING SUPERINTENDENT, M. J. TINLINE, B.S.A.

HORSES.

The horses on the Scott Experimental Station number fifteen. Five of these are young animals that have been raised on the Station.

WINTER FEEDING EXPERIMENTS.

The investigation into wintering idle work horses has been continued. Seven head of mature horses, weighing from 1,350 to 1,700 pounds, were turned out on the pasture during the day and stabled at night. The results from this experiment would indicate that oat sheaves make an economical feed for idle work horses. In the winter of 1914-15 oat chop and oat straw were fed in addition to the pasture, at a cost for feed of 13·5 cents per day for each horse. The cost during the past winter has only amounted to 5·6 cents per horse per day. A part of this difference is due to better pasturage, and better and cheaper oat crop, yet the oat sheaves assisted very materially in decreasing the cost.

METHOD OF FEEDING.

The horses were fed 2 pounds of oat chop in the morning, and then turned out to pasture. An oat sheaf was given each animal at night. Water was offered morning and night before feeding. On two evenings each week, boiled feed was substituted for the regular ration. Salt was given twice a week.

Prairie Horses—

Number of horses in experiment	7
Weight at beginning of experiment, November 13 ..Lb.	10,690
Weight at termination of experiment, March 31 "	10,880
Total gain in weight in 139 days "	190
Cost of Feed—	
Oat chop—1,946 pounds at 1 cent per pound $	19 46
Oat sheaves—7,148 pounds at $10 per ton "	35 74
Total cost for 139 days $	55 20
" per horse for 139 days "	7 88
Cost per horse per day ..Cts.	5·6

Three young horses, one rising 3 years old and two a year older, were turned out on the prairie with the older horses during the day and stabled with them at night. The method of feeding, and the feeds used were the same with both lots. The following table gives the average daily gain or loss, and the cost of feed per day for each horse:—

Cost of Wintering Mature vs. Young Horses.

Age of animals.	Average daily Gain or loss.	Cost of feed per horse, per day.
	Pounds.	Cents.
Mature horses, ages varying from 9 to 12 years	Gain 0·19	5·6
Young horses, rising 4 years	Loss 0·16	6·8
Young horse, rising 3 years	Gain 0·1	7·9

All the horses were in good condition at the commencement of the experiment. The mature horses and 4-year-olds were started off on the same rations. The 3-year-old received an additional allowance from the beginning of the experiment. After the first monthly weighing, the allowance for all the young horses was increased.

COST OF FEED FOR HORSES AT WORK DURING THE WINTER.

A record was kept of the feed consumed by a pair of geldings that were used to do the necessary teaming. These horses were working on an average of 10 hours per day during the early part of the winter. Later they were only required for approximately 6 hours each day.

Lot 2—Horses at work during the Winter—	
Number of horses in experiment	2
Weight at beginning of the experiment, November 13 Lb.	3,070
" termination of experiment, March 31 "	3,120
Total gain in weight in 139 days "	50
Cost of Feed—	
Oat chop—2,835 pounds at 1 cent per pound	$23 85
Oat sheaves—2,641 pounds at $10 per ton	13 20
Oat straw—1,799 pounds at $2 per ton	1 80
Total cost for 139 days	$38 85
" per horse for 139 days	19 42½
Cost per horse per day Cents.	13·9

COST OF RAISING HORSES.

In the investigation into the cost of horse raising, only the feed from weaning time has been taken into consideration. The feeds used are those available on the average farm. These were fed in such quantities as appeared conducive to rapid, healthy gains.

DAILY RATIONS FED COLTS.

The amounts given in the succeeding table were fed the colts as soon as they had become accustomed to winter feeding:—

Age.	Oat chop	Bran	Hay	Alfalfa	Oat sheaves
Months	Lb.	Lb.	Lb.	Lb.	
5 to 10	2½	7	4	3	½ sheaf
17 to 22	5	7	4	4	½ "
*29 to 34	5	–	–	–	1 "

*In pasture during the day.

COST OF FEED FOR COLT RISING ONE YEAR OLD.

The colt in this experiment was weaned when 5 months old. From November 13 to March 31 all the feed given this colt was carefully weighed. The following table gives the gains made by the colt, the total amounts and cost of feed consumed:—

Colt rising 1 year old—		
Weight at beginning of experiment, November 13	Lb.	675
Weight at termination of experiment, March 31	"	790
Total gain in weight in 139 days	"	115
Gain in weight in 1 day	"	0·82
Cost of Feed—		
Oat chop—342 pounds at 1 cent per pound		$ 3 42
Bran—140 pounds at 1¾ cents per pound		2 45
Oat sheaves—522 pounds at $10 per ton		2 61
Alfalfa hay—270 pounds at $12 per ton		1 62
Prairie hay—793 pounds at $10 per ton		3 96
Total cost for 139 days		$14 06
Cost for 1 day		10·1

NOTE.—The colt was kept in a light, airy box stall, and turned out in the paddock for a few hours every day, unless the weather was unusually stormy.

COST OF FEED FOR COLT RISING TWO YEARS OLD.

This colt was stabled at night during the spring of 1915, and allowed to run in the pasture during the day. During the summer it was in the pasture day and night, receiving no grain. Early in November it was brought into the stable and fed liberally of the feeds given in the following table:—

Colt rising 2 years old—		
Weight on April 1, 1915	Lb.	725
" March 31, 1916	"	1,125
Gain in 366 days	"	400
" 1 day	"	1·09
Cost of Feed—		
Oat chop—815 pounds at 1 cent per pound	$	8 15
Bran—139 pounds at 1¾ cents per pound	"	2 43
Oat sheaves—704 pounds at $10 per ton	"	3 52
Alfalfa hay—360 pounds at $12 per ton	"	2 16
Prairie hay—960 pounds at $10 per ton	"	4 80
Pasture—7 months at $1 per month	"	7 00
Total cost for 366 days	$	28 06
" 1 day	Cents.	7·6

A few hours daily in the paddock, when not at pasture, has kept the limbs in good shape.

COST OF FEED FOR COLT RISING THREE YEARS OLD.

This colt was on pasture during the summer, and was stabled at night after November 13. During the latter part of March he was kept off the pasture and broken to harness.

Colt rising 3 years old—		
Weight on April 1, 1915	Lb.	1,000
" March 31, 1916	"	1,275
Gain in 366 days	"	275
" 1 day	"	0·75
Cost of Feed—		
Oat chop—659 pounds at 1 cent per pound	$	6 59
Oat sheaves—1,197 pounds at $10 per ton	"	5 98
Prairie hay—180 pounds at $10 per ton	"	0 90
Pasture—7 months at $1 per month	"	7 00
Total cost for 366 days	$	29 47
" 1 day	Cents.	5·6

SUMMARY of Cost of Feed for Colts from Weaning until ready for Harness.

From time of weaning until 1 year old	$14 06
" 1 to 2 years old	28 06
" 2 to 3 " old	20 47
Total cost from weaning until ready for harness	$62 59

EXPERIMENTAL STATION, LACOMBE, ALTA.

REPORT OF THE SUPERINTENDENT, G. H. HUTTON, B.S.A.

HORSES.

The season of 1915 was not particularly trying on the work horses at Lacombe. Spring opened moderately early and work proceeded under favourable weather conditions without interruption until seeding was completed. The harvest operations were begun comparatively early, and the completion of threshing made possible the finishing of fall ploughing and other fall work on the land before freeze-up, with horses in good condition. All of the horses except those actually needed for work during the winter have been wintered outside in the open, having been fed prairie hay and a limited amount of grain during the entire winter, and are in splendid shape to commence work when the season opens.

The horses at the Lacombe Station number twenty-four head, of which thirteen are mares. There are two pure-bred Percheron mares, four pure-bred and seven grade Clydesdale mares. Four foals were raised in 1915, three of which are moderately good representatives of the Clydesdale breed, while a fourth is unfortunately subject to frequent attacks of rheumatism, which in all probability will render it of little value, and may necessitate its destruction. Several foals are expected late in the season of 1916, and as all the mares were bred to foal late, it is hoped that the success which has in the past attended the practice of breeding late will be again experienced this coming season.

During the past winter, as has already been stated, the majority of the horses have wintered in the open, where they were fed hay and grain. The hay was fed in a hay rack holding a large load or about one and a half tons at once, while the grain was fed on grain tables. The average daily consumption of hay per horse was 28·3 pounds, while the grain consumed per head amounted to 4·4 pounds. Figuring the hay at $5 per ton, and grain at 1 cent per pound, the cost per day per horse amounts to 11·47 cents. This ration is, however, much more than a maintenance one, as all the horses have increased in weight. Various methods of outdoor wintering of horses have been tried at this Station, and all of them have their advantages. Horses run to the straw stacks have, as a rule, come through in good condition, particularly when there has been an abundance of straw and the horses have had an opportunity to consume a fair amount of chaff. The straw stack in the corral as a place for wintering horses has not given as good satisfaction as the straw stack in the pasture field, particularly when the grass has not been too closely pastured during the previous summer season. Horses being wintered under such conditions will alternate their ration between the straw stack and the grass available, and winter in good shape. While the method of wintering as practised during the past season is the most expensive of the three systems to which reference has been made, it is only fair to state that the horses show the result of the increased cost, and would appear to be in better heart for commencing the spring work than when wintered under other conditions.

In the report for the year ending March 31, 1915, the cost of producing a pound of gain on fillies during the period from 1 year to 2 years of age was shown to be 6·95 cents. The cost of carrying the fillies for the next twelve months' period is shown in the following table, and as these fillies are now old enough and large enough to earn

their keep in the future, the cost of producing gain in weight on work horses is probably closely approximated in these figures:—

Cost of Carrying Three Fillies Two Years Old in the Summer of 1915 from April 1, 1915, to March 31, 1916.

Gross weight, April 1, 1915	lb.	3,520
14,082 pounds hay at $10 per ton	$	70 41
2,376 pounds grain at 1 cent per pound	"	23 76
Six months' pasture at $1 per month per head	"	18 00
Total cost for one year	"	112 17
Cost per head for one year	"	37 39
Gross weight, March 31, 1916	lb.	3,850
Total gain	"	330
Average gain	"	110
" daily gain	"	301
Cost of 1 pound of gain on 2-year-old fillies	cts.	0·3399
Total cost for first year	$	50 59
" second year	"	94 65
" third year	"	112 17
" to raise	"	257 41
Cost per head to raise	"	85 80
" pound to raise	cts.	6·7

The cost of growing four foals from the time they were weaned in December until the 31st of March is given in the following table. Since the mares producing these foals were used in part during the spring seeding, and were used at light fall work also, no estimate is made of the cost of pasturing the mare during the time the foal was suckling. No account is taken of the cost of service. Since service fees vary widely, and since estimates as to the value of pasturing for mares suckling foals would also introduce wide differences of opinion, these items have been left out of this calculation, and may be added to the costs here given as local conditions warrant.

Cost of Carrying Four Foals from December 1, 1915, to March 31, 1916.

7,420 pounds green feed at $10 per ton		$37 10
1,500 " oats at 1 cent per pound		15 00
1,500 " bran at 1 cent per pound		15 00
1,675 " skim-milk at 20 cents per 100		3 35
Total cost of feed for four months		$70 45
Gross weight of four colts at March 31	lb.	2,900
Average cost per colt to winter	$	17 61

EXPERIMENTAL FARM, AGASSIZ, B.C.

REPORT OF THE SUPERINTENDENT, P. H. MOORE, B.S.A.

The horses have been kept exclusively for working purposes and no addition has been made to the force during the year. The force consists of ten work horses, one old general purpose mare, and a driving mare.

No experimental work was done during the year. However, careful record was kept of the labour performed and the food consumed as well as other items of expense during the year. On account of conditions which obtained on the Farm during the winter the number of hours of labour performed is somewhat less than the average year. Such a condition increases the cost per hour of labour performed. The accompanying table sets forth in detail the results of the year's performance with the figures reduced to an average per horse per year.

	Heavy Draught.	Light Draught.
Yearly weight.....lb.	1,796	1,529
Hay consumed..... "	10,039	6,667
Grain consumed..... "	4,676	3,221
Roots consumed..... "	626	636
Green feed consumed..... "	836	787
Total cost of feed consumed..... $	105·62	72·36
Cost of feed for summer (9 months)..... $	81·60	53·62
Cost of feed for winter (3 months)..... $	24·02	18·74
Number of hours labour for year.....	1,598·	1,572·
Average feed cost per hour's work.....cts.	6·61	4·60

The horses were not allowed to pasture during the year. They are all in good health except the two old ones that are practically worn out. None of them was allowed to get fat but they were kept in good working condition throughout the year.

EXPERIMENTAL STATION, SIDNEY, B.C.

REPORT OF THE SUPERINTENDENT, LIONEL STEVENSON, B.S.A., M.S.

HORSES.

At the Experimental Station for Vancouver island the following horses were kept for labour purposes during the year: two grade shire geldings weighing 1,500 pounds each, three grade geldings weighing 1,400 pounds each, one grade driver weighing 1,250 pounds.

The following ration was fed, from April 1 to October 31: 1 pound of crushed oats, 4 ounces of wheat bran, and 1 pound of mixed hay per day per hundred pounds live weight. From November 1 to March 31 the quality of grain fed was the same, but oat straw was substituted for hay. From November 1 to June 1 each horse was given 3 pounds of carrots per day. A supply of rock salt was before the horses at all times.

The above ration gave very satisfactory results; the horses were working hard throughout the year and maintained or increased weight.

SHEEP.

CENTRAL EXPERIMENTAL FARM, OTTAWA, ONT.

REPORT OF THE DOMINION ANIMAL HUSBANDMAN,

E. S. ARCHIBALD, B.A., B.S.A.

BREEDING SHEEP.

This class of live stock made very rapid progress as to numbers and quality, the natural increase during the past fiscal year being forty-four head. There are now one hundred and forty-two pure-bred sheep in the flocks. Two breeds only are maintained, namely, Shropshires and Leicesters.

The Shropshires include eighty-eight head, made up of five rams, thirty-one breeding ewes, ten shearling ewes, twenty ewe lambs, and twenty-two ram lambs.

The Leicesters number fifty-four head, made up of one ram, twenty-two breeding ewes, seven shearling ewes, nine ewe lambs, and fifteen ram lambs.

A very successful year can be reported in the breeding operations with sheep. Although at the time of last reporting the Leicesters had not lambed and the lamb crop came very late and was comparatively light, yet both breeds were summered very economically and went into winter quarters in excellent shape. The breeding season in the fall of 1915 was purposely started early and almost all the ewes have lambed before April 1, 1916. The result of this lambing is 148 per cent increase. Owing to the very favourable condition of the past summer for pasture, all the sheep were maintained in good condition on the 2 acres of pasture, roadsides, and the forest belt. However, the splendid aftergrass was utilized by both ewes and lambs.

I am pleased to report that during the past fiscal year both the ewes and lambs were attacked only to a slight extent with tapeworms and stomach worms. This is the first summer in which all the sheep have not been drenched for these internal parasites, yet the flock remained very healthy throughout the season. Two preventives for these parasites were carefully tried during the past season. These are commonly found on our markets, under the names of *Medico* and *Sal Vet*. These two repellents were used liberally throughout the spring, summer, and fall seasons, both for the ewes and lambs. Both these repellents apparently had about the same influence in killing these pests in the adults and preventing their distribution to the lambs.

SHEEP-FEEDING EXPERIMENTS.

In the fall of 1915 one hundred wether lambs of grade breeding and uniform size and weight were purchased and delivered to the Central Experimental Farm. These lambs were dipped a few days after their arrival and, together with the pure-bred lamb crop on this farm, were run on the excellent aftergrass for two weeks, when they were put into winter quarters and divided into six lots for experimental feeding. The experiment here outlined was conducted under the supervision of Mr. G. B. Rothwell, First Assistant in this Division, and the results of the experiment compiled by him.

SESSIONAL PAPER No. 16

LAMB-FEEDING EXPERIMENTS.

Nos. 1A and 1B, Winter, 1915-16.

On October 13, 1915, one hundred lambs were purchased for experimental feeding purposes. This flock, composed of ewes and wethers, was in good uniform condition for a period of finish feeding, the fall pasturage throughout the locality having been excellent. From October 13 until November 17 these lambs were pastured on good clover aftermath and third growth which from the feeder's standpoint would otherwise have been wasted, the greater part of the sod being subsequently fall ploughed.

On November 17, the entire flock was divided into five lots, and after individual weighing of the lambs the experiment to be described was commenced.

The work is being reported as two distinct experiments, the first, herewith outlined and summarized, being composed of ten of the heaviest lambs in each lot (fifty in all) fed for four weeks, for the Christmas market. The lots in experiments 1B were composed of the balance fed for later disposal.

OBJECT OF EXPERIMENT.

To compare the protein in various meals.

To discover the comparative value of two new protein meals recently introduced into Canada.

To discover the best nutritive ratio for fattening lambs.

PLAN OF EXPERIMENT.

Meal mixtures are herewith given for the individual groups. Each lot received the same foodstuffs throughout the experiment. All lots were as uniform as possible as to weight and condition.

Lot No	Pen No.	Meal Mixture, pounds.
1	1	Corn (cracked)..... 100, bran 100, whole oats 300
2	2	Gluten feed..... 100, " 100, " 300
3	3	Cottonseed Meal..... 60, " 100, " 300
4	4	Linseed meal..... 80, " 100, " 300
5	5	Peanut meal..... 55, " 100, " 300

PLAN OF FEEDING.

Preparatory Period—October 15 to November 17.—During this period all lambs were dipped. All received the same feeding of grass, hay, etc., and of grain (which was made up of whole oats 3 parts; bran 1 part; and fed at the rate of 3 pounds per pen per day).

EXPERIMENTAL PERIOD.

Roughages.—All lambs received the same quantity of the same roughages throughout the experiment. Hay was fed at approximately 1½ pounds per lamb per day; ensilage at approximately 1¾ to 2 pounds per head per day.

Ottawa.

Grains.—Grain was fed first followed by roughage.
The following quantities were given per lamb per day:—

First	week—	8	ounces.
Second	" —10	"	
Third	" —12	"	
Fourth	" —14	"	
Fifth	" —16	"	
Sixth	" —18	"	
Seventh	" —20	"	to continue until the end of the experiment.

Weights.—Each lamb was weighed individually.
Lambs were weighed at end of preparatory feeding period and every two weeks thereafter.

In discussing the results of both experiment 1A and 1B the following interesting statement may be referred to, showing the actual profits accrued, from the time the lambs were bought until they were sold. The profits as shown by the complete summaries of the tests are considerably less, as will be readily understood, being estimated in the latter case, only on the experimental periods, and from gains made within those periods alone. No charge is made for pasture, which, as explained, would have been frozen or ploughed down; the price charged for hay in this case was high, as only a low quality was available.

BALANCE SHEET showing Actual Profits on Lambs in Experiment 1A from Purchase to Sale.

Short-keep Lambs.

October 13, 1915—	
To 50 lambs, average 100 pounds each at 7¾ cents	$387 50
4 weeks grain feeding 50 lambs—	
Average 10 ounces per day grain at 1⅝ cents per pound	12 25
" 1¾ pound silage daily at $2 per ton	2 45
" 1½ " hay daily at $7 per ton	7 35
To three weeks pasture	—
Total cost	$409 55
December 18, 1915—	
By sale (including 210 pounds shrinkage)—	
50 lambs, 5,700 pounds at 9 cents	513 00
To profit	$103 45

Profit over feed per lamb, $2.07.

The prices charged for the various feeds were as follows:—

	Per Ton.
Corn	$32 00
Gluten feed	32 00
Oats	30 00
Linseed oil meal	38 00
Cottonseed meal	33 00
Peanut oil meal	40 00
Bran	20 50
Hay	7 00
Ensilage	2 00

The following table contains all data in connection with Experiment 1A:—

SHEEP-FEEDING EXPERIMENT No. 1A—(Short-keep Lambs).

Lot.	1	2	3	4	5
Feed Given.	Corn (cracked) Bran Oats	Gluten Feed Bran Oats	Cottonseed Meal Bran Oats	Linseed Oil Meal Bran Oats	Peanut Oil Meal Bran Oats
Number of animals in each group—10....	10	10	10	10	10
First weight, gross (date, Nov. 17)...lb.	1,089	1,111	1,065	1,028	1,085
First weight, average.....“	108·9	111·1	106·5	102·8	108·5
Finished weight, gross (date Dec. 15) “	1,197	1,223	1,166	1,123	1,213
Finished weight, average.....“	119·7	122·3	116·6	112·3	121·3
Number of days in experiment.....	28	28	28	28	28
Total gain for period.....lb.	108	112	101	95	128
Average gain per animal.....“	10·8	11·2	10·1	9·5	12·8
Average daily gain for group.....“	3·86	4·	3·6	3·4	4·57
Average daily gain per animal.....“	·386	·4	·36	·34	·457
Quantity meal eaten by group for period.....“	192,5	192.5	192·5	192·5	192·5
Quantity hay eaten by group for period.....“	420	420	420	420	420
Quantity ensilage eaten by group for period.....“	490	490	490	490	490
Months on pasture.....	.....	.....	.....	.....	.....
Total cost of feed.....$	4 69	4 69	4 67	4 79	4 77
Cost of feed per head.....$	·469	·469	·467	·479	·477
Cost of feed per head per day.....$	·016	·016	·016	·017	·017
Cost to produce 1 pound gain.....$	·043	·041	·046	·05	·037
Original cost of animals at 7¾ cents per pound.....$	84·50	86·10	82·53	79·67	84·08
Original cost plus cost of feed..... $	89·19	90·79	87·20	84·46	88·85
Selling price at 9 cents per hundred pounds.....$	107·73	109·07	104·94	101·07	109·17
Net profit or loss per group..... $	18·54	18·27	17·74	16·61	20·32
Net profit or loss per animal..... $	1·85	1·82	1·77	1·66	2·03
Nutritive ratio of meal mixture.....	1 : 6·67	1 : 4·75	1 : 4·27	1 : 4·08	1 : 3·95

The practical feeder will at once be impressed by the satisfactory showing of actual profits. The rapid gains were mainly due, first, to the fact that the lambs were a healthy, well-grown lot in the thrifty condition necessary to obtain maximum gains in the subsequent grain-feeding period, and, second, to the proper utilization of good aftergrass that might otherwise have been unused. Excellent clover pasturage as described, combined with fine weather late into November, left the flock in such uniform condition that when divided into five lots and fed for twenty-eight days as outlined, little difference was shown in gains or costs to produce. The cheapest gains were made by lot 5 with peanut oil meal as the comparative meal ration component, a result which may seem surprising in view of the fact that this meal proved rather unpalatable in the case of both cattle and swine, with a corresponding lowering of gains and production. The most expensive gains, on the other hand, were made with the ration containing linseed oil meal.

COMPARATIVE VALUE OF FEEDS ON A COMMERCIAL BASIS.

The following figures indicate the commercial values of the feeds tested when compared with gluten feed at $32 per ton, as calculated from the results of the experiment: lot 1, corn, $29.28 per ton; lot 3, cottonseed meal, $23.75 per ton; lot 4, linseed oil meal, $6.87 per ton; lot 5, peanut meal, $68.43 per ton.

OTTAWA.

While the experimental evidence does not show a distinct and well-founded advantage for any one of the mixtures tested, one fact is strongly emphasized. The lambs when taken from pasture were in the unfinished stage; that is, although growthy and thrifty, they lacked the bloom of the finished animal. However, they were in better condition than the average lambs as disposed of in the fall by many farmers throughout the country. The intelligent and economical use of grain with cheap roughage in the short period of twenty-eight days, however, brought this fifty head to the prime condition commanding top prices. As soon as this stage was reached the lambs were sold. The condition of the remainder of the original 100 head (experiment 1B) indicated the economy of further grain feeding, which was continued as per outline until February 9, 1916, when the lambs were given three weeks' finish feeding and marketed.

The following table shows the results of experiment 1B:—

SHEEP-FEEDING Experiment No. 1B (Long-keep Lambs).

Lot.	1	2	3	4	5
Feed Given.	Corn (cracked) Bran, Oats.	Gluten Feed, Bran, Oats.	Cottonseed Meal, Bran, Oats.	Linseed Oil Meal, Bran, Oats.	Peanut Oil Meal, Bran, Oats.
Number of animals in each group	9	10	10	10	10
First weight, gross, (date Nov. 17) lb.	810	905	876	870	898
First weight, average "	90	90·5	87·6	87	89·8
Finished weight, gross, (date Feb. 9, 1916) "	978	1087	1033	1011	1073
Finished weight, average "	108·7	108·7	103·3	101·1	107·3
Number of days in experiment	84	84	84	84	84
Total gain for period lb.	168	182	157	131	175
Average gain per animal "	18·7	18·2	15·7	13·1	17·5
Average daily gain for group "	2	2·17	1·87	1·57	2·08
Average daily gain per animal "	·22	·217	·187	·157	·2
Quantity meal eaten by group for period "	788·4	866·5	866·5	866·5	866·5
Quantity hay eaten by group for period "	1134	1260	1260	1260	1260
Quantity ensilage and roots eaten by group for period "	1933	2170	2170	2170	2170
Total cost of feed $	17·08	18·88	18·79	19·31	19·31
Cost of feed per head $	1·89	1·89	1·88	1·93	1·93
Cost of feed per head per day $	·022	·022	·022	·023	·023
Cost to produce 1 pound gain $	·101	·103	·119	·147	·110
Original cost of animals at 7¾ cents per pound $	62·77	70·13	67·89	67·42	69·61
Original cost plus cost of feed $	79·85	89·01	86·68	86·73	88·90
Selling price at 10 cents per 100 pounds $	97·80	108·70	103·30	100·10	107·35
Net profit or loss per group $	17·95	18·69	16·62	13·37	18·39
Net profit or loss per animal $	1·99	1·86	1·66	1·33	1·83
Nutritive ratio of meal mixture	1 : 6·67	1 : 4·75	1 : 4·27	1 : 4·07	1 : 3·90

Throughout the experiment the health of the various lots was excellent, with the exception of one lamb in lot 1 which died of impaction. In experiment 1A, little difference was shown in cost of production for the various meals, due to the short feeding period and to the uniformly good condition of the lambs at the start. In other words, any one of a number of well-balanced finishing meal rations might have shown profitable results, the comparative gains for four weeks' feeding period depending largely on the quality and capacity of the individuals of the groups fed. In experiment 1B, of twelve weeks' duration, however, the ration containing corn, oats and bran, as might be expected, was responsible for the cheapest gains with only a slight decrease in cost over the gluten meal and peanut meal rations. The rations containing cottonseed meal and linseed meal stand in fourth and fifth places respectively, as in experiment 1A.

OTTAWA.

Palatability of Rations.—All rations were quite acceptable to the lambs, the cracked corn ration (lot 1) proving particularly so, as would be expected from its composition and texture, as compared with the other rations.

A brief financial statement of this experiment is herewith given together with a summary of profits made on the lambs of both experiments.

Long-keep Lambs.

October 13, 1915—	
To 50 lambs, average weight 92⅛ pounds at 7¾ cents	$357 66
15 weeks feeding 50 lambs—	
5,510 pounds grain at 1⅜ cents per pound	77 14
11,000 " silage and roots at $2 per ton	11 00
7,655 " hay at $7 per ton	26 79
To 3 weeks pasture—no charge.	
1 lamb lost (impaction), 98 pounds at 9 cents	8 82
Total cost	$481 41
March 4, 1916—	
By 2 lambs, dressed	$ 16 15
3 pelts	6 60
47 lambs, 5,100 pounds at 10 cents	510 00
Total returns	$532 75
To profit	$51 34
Profit per lamb	1 03
Summary.	
Total profit, 100 lambs	154 79
Average profit per lamb	1 55

The long-feeding period even with 1 cent per pound greater spread between buying and selling prices reduced the profit per lamb almost 50 per cent as compared with the results of experiment 1A. While the long-keep lambs were not fit for sale at the time the first fifty were disposed of, it is quite possible that, from the standpoint of greater profits alone, they might have been disposed of earlier with more profitable results. The comparisons afforded by the two experiments, the one making use of a short finishing period as against the results of following a common practice of long feeding, are interesting to the feeder. It would appear that the use of a good grain finish ration following late fall pasture is distinctly profitable.

QUALITY OF LAMBS WHEN SOLD ON TORONTO MARKET.

The lambs of experiment 1A were sold at Toronto in December, 1915, for $8.75 to $10.15 per cwt., topping the market. The quality of the lambs of experiment 1B was even more gratifying to the feeder, as in March, 1916, they were sold for $11.25 to $13.75 per cwt., the record price for lambs on the Toronto market.

Average of Experiment 1A and 1B.—Allowing for certain fundamental differences in these tests an average of the two is interesting:—

RELATIVE Standing of Lots in Experiments 1A and 1B. (Average gain and economy of gain.)

Experiment.	Lot.				
	1A and 1B (corn).	2A and 2B (gluten).	3A and 3B (cotton-seed).	4A and 4B (linseed).	5A and 5B (peanut).
1A (Short-Keep)	3rd	2nd	4th	5th	1st
1B (Long-Keep)	1st	2nd	4th	5th	3rd

AVERAGE of Gains, Cost of Production and Profit per Animal in Experiments 1A and 1B.

Lot.	Average gain per Animal.			Cost to produce 1 lb. Gain.			Net profit per Animal.		
	1A	1B	Av.	1A	1B	Av.	1A	1B	Av.
	lb.	lb.	lb.	c.	c.	c.	$ c.	$ c.	$ c.
Lot 1 (corn)	10·8	18·7	14·75	4·3	10·1	7·2	1·85	1·99	1·92
Lot 2 (gluten)	11·2	18·2	14·7	4·1	10·3	7·2	1·82	1·86	1·84
Lot 3 (cottonseed)	10·1	15·7	12·9	4·6	11·9	8·25	1·77	1·66	1·715
Lot 4 (linseed)	9·5	13·1	11·3	5·0	14·7	7·6	1·66	1·33	1·495
Lot 5 (peanut)	12·8	17·5	15·15	3·7	11·0	7·35	2·03	1·83	1·93

COMPARATIVE VALUES OF FEEDS ON A COMMERCIAL BASIS.

With gluten meal valued at $32 per ton, the results of the foregoing experiment would indicate that in lot 1 corn was worth $34.22 per ton; lot 3, cottonseed meal, a valuation of $4.24 per ton; lot 4, linseed oil meal, a minus valuation of $14.68; lot 5, peanut meal to $26.04 per ton.

FINANCIAL STATEMENT FOR SHEEP.

Below are submitted inventories and returns for sheep on the Central Experimental Farm during the year April 1, 1915, to March 31, 1916.

	April 1, 1915.		March 31, 1916.		Returns, including sales.	Gross returns, made up of increased value and sales and manure.
	No.	Value.	No.	Value.		
		$		$	$	$
Sheep, all breeds and ages	98	2,517 00	144	3,407 50	1,797 46	2,687 96

RETURNS.

By increase in value of flocks	$ 890 50	
Sales of breeding stock	423 00	
Sales of feeding lambs	1,107 15	
Sale of wool	167 31	
Manure, 100 tons at $1	100 00	
Gross returns		$2,687 96

EXPENDTURES.

To food consumed	$ 731 00	
Breeding ram purchased	72 50	
Feeding lambs purchased	745 16	
Labour expended	700 00	
Gross expenditures		$2,248 66
Net balance from sheep		$ 439 30

OTTAWA.

EXPERIMENTAL STATION, CHARLOTTETOWN, P.E.I.

REPORT OF THE SUPERINTENDENT, J. A. CLARK, B.S.A.

EXPERIMENTS IN FATTENING LAMBS.

The lamb fattening experiments undertaken during the winter of 1915-16, were as follows: first, clover hay vs. mixed grain, cured for hay, were compared as roughages; second, heavy vs. light grain ration for fattening lambs to determine which is most economical.

The price of lambs was very high in the autumn of 1915, many being sold at country points at 7¼ cents per pound live weight. The price being so high, we delayed buying until late in the season. Thirty lambs were purchased at 7 cents per pound live weight, fasted, f.o.b. Charlottetown. They were given a preliminary period of feeding and weighed into their pens on December 1, 1915. The cost of feed up to that time was added to their original cost and divided into the net weight of the lambs at the beginning of the fattening period. The lambs had filled up and made such good gains on clover hay and turnips that the cost price had been reduced to $6.65 per cwt. on December 1, 1915. Vigorous young wether lambs of first quality were selected out of a drove of five hundred.

The previous data obtained by fattening lambs at this Station were carefully studied, and it was decided to conduct two experiments. The first one was planned to secure further information regarding the comparative value of roughages. In former feeding experiments, clover hay gave excellent returns and when fed with a heavy grain ration and roots had produced one pound of gain at a lower cost than any other roughage. The roughage fed to the lots was as follows: Lot I was fed clover hay; lot II was fed mixed grain hay up to the 20th of February, when the supply became exhausted and other hay was substituted. The mixed hay was obtained by cutting the oats and barley, that had been sown in equal parts, when in the milk stage, and curing it as hay. These two lots of ten lambs each received a heavy grain ration made up as follows: 1 pound barley, 4½ pounds oats, and 1 pound bran, amounting to 10 ounces of meal per lamb per day. The barley and oats were fed whole. The oats and the bran were each increased at the rate of one-tenth of a pound per day to each lot until during the finishing period the lots received 1 pound barley, 11½ pounds oats, and 2½ pounds bran, amounting to 24 ounces per lamb per day. The lots each received 20 pounds of turnips at start. This was gradually decreased to 12 pounds at the end of the experiment. The finished lambs were sold by public auction. The average price obtained was 10¾ cents per pound live weight.

In calculating the cost of feeding, the following prices were charged: Hay, $10 per ton; grain, $29 per ton; bran, $23.90 per ton; and roots, $2 per ton.

TABLE I.—Lamb Fattening Experiments.—Clover Hay versus Mixed Grain Hay.

Lot.		I.	II.
Class of Feed for Lot.		Clover hay and heavy grain ration.	Mixed grain hay and heavy grain ration.
Number of lambs in lot		10	10
Number of days in experiment		110	110
Total weight at beginning	Lb.	810·5	810·5
Total weight at end	"	989	996
Gain, during period	"	178·5	185·5
Gain per head	"	17·85	18·55
Gain per head per day	"	·162	·168
Quantity of meal eaten by lot	"	1,122·7	1,187·6
Quantity of clover hay eaten by lot	"	1,986·	594
Quantity of mixed grain hay eaten by lot	"	.....	1,356
Quantity of roots eaten by lot	"	1,247	1,257
Total cost of feed	$	26·84	24·19
Cost of feed per head	$	2·68	2·42
Cost of feed per head per day	$	·024	·021
Original cost of lambs at $6.65 per cwt. live weight	$	53·90	53·90
Original cost of lambs plus cost of feed	$	80·74	78·09
Selling price at 11 cents per pound	$	108·79	.....
Selling price at 10⅞ cents per pound	$	.....	108·30
Net profit on lot	$	28·05	30·21
Net profit on lamb	$	2·80	3·02
Cost to produce 1 pound gain	cts.	15·0	13·0

The second experiment was to determine the relative value of a heavy versus a light grain ration in fattening lambs.

The same lot, namely, No. I, the feeding of which has already been described, was used as a check and lot No. III compared with it. Both lots were fed good clover hay and roots, lot III eating a little more of each than lot I during the finishing period. Lot I received a heavy grain ration, starting with 10 ounces of grain per lamb per day and finishing with 18 ounces of grain per lamb per day. Lot III was fed a light grain ration, starting with 6·4 ounces of grain per lamb per day and finishing with 18 ounces of grain per lamb per day.

CHARLOTTETOWN.

TABLE II.—Lamb Fattening Experiments—Heavy Grain versus Light Grain Ration.

Lot.		I.	III
Class of Feed for Lot.		Clover hay and heavy grain ration.	Clover hay and light grain ration
Number of lambs in lot		10	
Number of days in experiment		110	10
Total wieght at beginning	lb.	810·5	110
Total weight at end	"	989	809·5
Gain during period	"	178·5	948
Gain per head	"	17·8	138·5
Gain per head per day	"	·162	13·8
Quantity of meal eaten by lot	"	1,122·7	·126
Quantity of clover hay eaten	"	1,986	902·4
Quantity of roots eaten	"	1,247	2,177
Total cost of feed	$	26·84	1,257
Cost of feed per head	$	2·68	24·67
Cost of feed per head per day	$	·024	2·46
Original cost of lambs at $6.65 per cwt. live weight	$	53·90	·022
Original cost of lambs plus cost of feed	$	80·74	53·83
Selling price at 10½ cents per pound	$	.....	78·50
Selling price at 11 cents per lb	$	108·79	99·54
Net profit on lot	$	28·05	.....
Net profit on lamb	$	2·80	21·64
Cost to produce 1 pound gain	cts.	15·0	2·10
			17·9

The lambs were weighed individually each week. In the following table of weights and gains, the weight taken nearest the first of each month is given in addition to the final fasted weight. The dressed weight was obtained of all the lambs in lot II. These averaged 48·4 per cent of their fasted weight.

LAMB Fattening Experiments—Table of Weights and Gains.

	Dec. 1.	Jan. 4.	Feb. 1.	Feb. 28.	March 20, Fasted.	Total Gain.
Lot I.	lb.	lb.	lb.	lb.	lb.	lb.
Tag No. 50	84	88	92	95	97	13
" 51	84	92	101	106	107	23
" 52	86	94	100	104	105	19
" 53	74	74	81	83	81	7
" 56	87	98	105	106	106	19
" 57	71	85	91	98	97	26
" 58	74	85	92	107	102	28
" 59	88	100	103	109	102	14
" 60	96½	106	107	108	108	11½
" 65	66	76	87	86	84	18
Total	810·5	898	959	1,002	989	178·5
Lot II.						
Tag No. 54	74	74	77	83	80	6
" 55	86	93	97	103	106	20
" 61	80	87	92	99	100	20
" 63	85	96	102	116	119	34
" 64	67½	77	81	87	90	22½
" 66	80	88	99	104	105	25
" 67	93	96	99	108	105	12
" 68	74	83	88	88	81	7
" 69	91	103	100	114	113	22
" 76	80	83	86	95	97	17
Total	810·5	880	921	998	996	185·5
Lot III.						
Tag No. 62	81	90	96	100	101	20
" 70	64	76	81	91	84	20
" 71	87	97	102	101	104	17
" 72	86	91	95	96	95	9
" 73	89	98	102	105	101	12
" 74	90	97	100	103	99	9
" 75	65	70	76	79	72	7
" 77	86	87	94	104	95	9
" 78	85	95	103	103	99	14
" 79	76½	83	92	98	98	21½
Total	809·5	884	941	980	948	138½

Deductions.—From the above tables we gather that clover hay is the best roughage we have used for fattening lambs. The table of weights and gains shows that lot II, while fed mixed grain hay, or until February 20, did not make as good gains as lot I. From that time on, however, after they were fed clover hay, they made more rapid gains.

The lambs fed with a heavy grain ration made greater gains and more economical gains than those fed on a light grain ration. Good healthy lambs in medium flesh make better feeders than light stunted lambs such as were used in 1914-15 and give much better profits for the feed and the money invested even though the first cost was much higher.

The average run of lambs that are marketed in the autumn can be fed with a small expenditure of labour, at a time when other farm work is slack and will return a good margin of profit even at the present high value of feeding material

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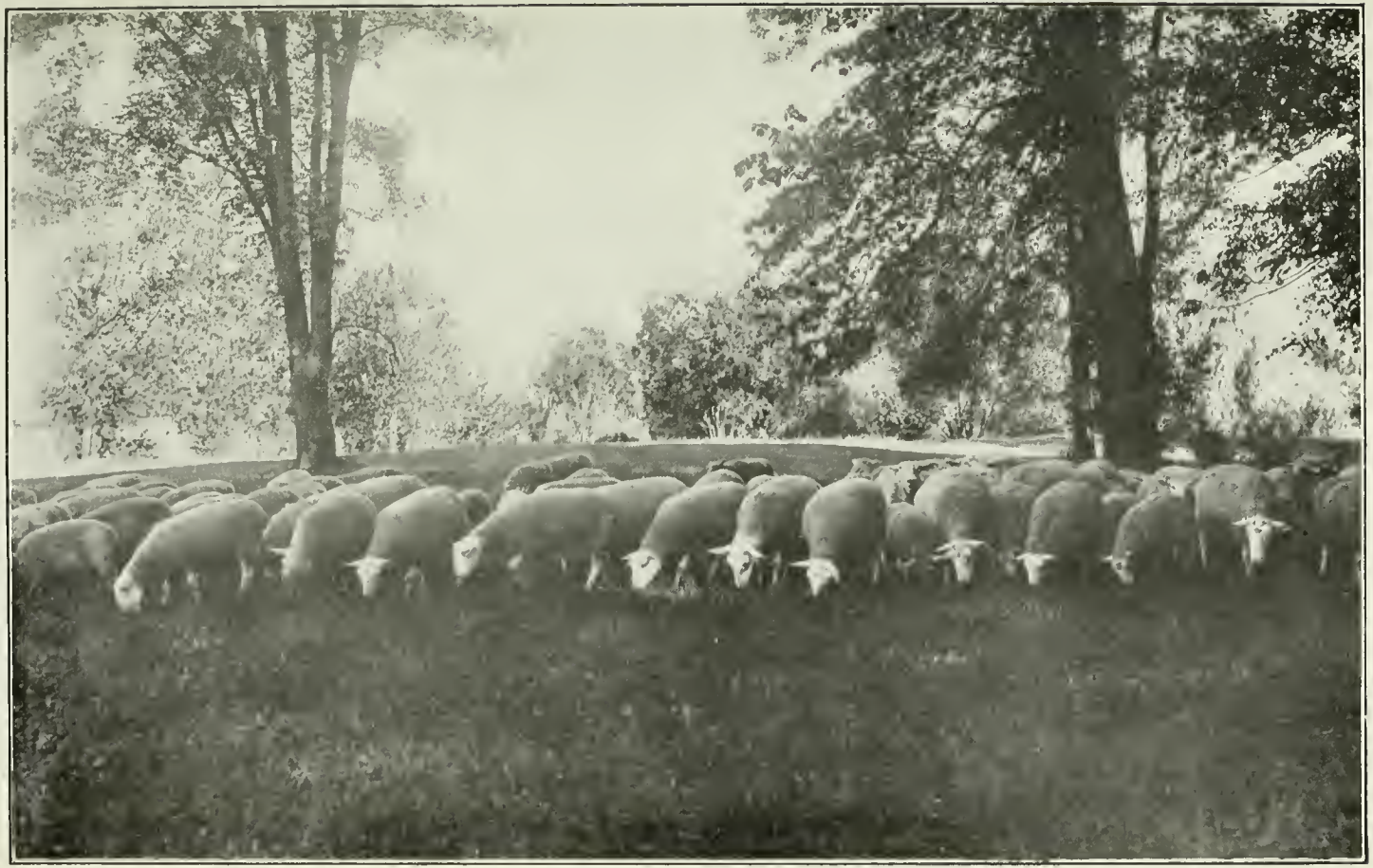
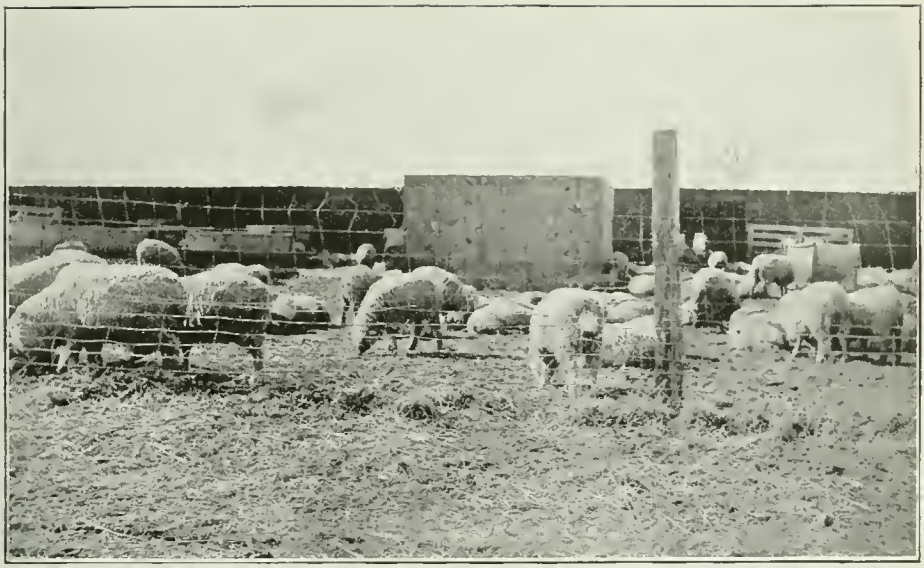


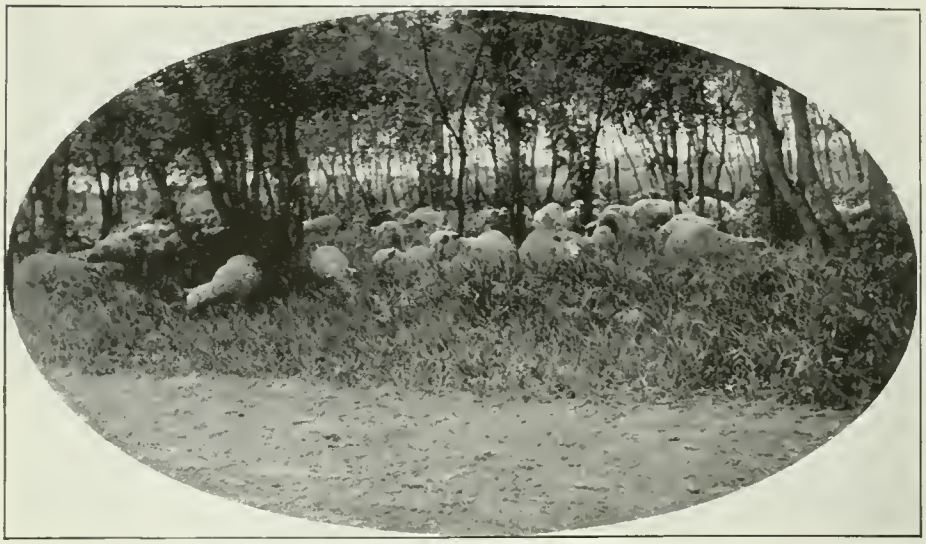
Leicester Ewes, Central Experimental Farm, Ottawa.

Straw shed used for wintering sheep. Scott Experimental Station. Note colts housed temporarily therein.



View of lambs in field lot. Experimental Station, Lethbridge, Alta.

Lacombe, Alta. The centre pair show the effect of the first cross of Shropshire blood on the common range ewes of the country, as shown at each end of the picture. Dams weigh 145 heavy in lamb. Lambs weigh 125 when less than one year old.



Pasturing Sheep in Shelter Belts. Experimental Farm, Indian Head, Sask.

Agassiz, B.C. Horned Dorset Flock and Grade Sheep, 1915-16.

EXPERIMENTAL FARM, NAPPAN, N.S.

REPORT OF THE SUPERINTENDENT, W. W. BAIRD, B.S.A.

SHEEP.

BREEDING FLOCK.

The breeding flock kept at this Farm is Shropshires, consisting of one five-shear, one four-shear, five three-shear, one two-shear, five shearlings, and one aged ram, Kelsey's Promise. The latter heads the flock.

The returns from the flock have been good, but owing to the unavoidable loss of three ewes the profit is cut down considerably. One three-shear died from wool ball in paunch; one three-shear died from rupture of blood vessel at lambing time and the third ewe, a two-shear, was killed shortly after lambing, as much trouble was experienced both before and after lamb birth with inversion of the womb.

The crop of lambs was fairly good. The eleven ewes averaged a lamb each, but owing to the loss of the three ewes just at lambing time we were unfortunate in not being able to save the four lambs dropped at that time. Therefore there remains only seven out of the eleven dropped. These are doing nicely and will, no doubt, make a good showing as breeders.

The crop of lambs dropped last season, of which there were nine, consisted of six ewes, which were retained to increase the breeding flock, and three nice ram lambs, which were disposed of as breeders.

The following table gives the amount of feed consumed by the flock this year, also the financial standing of the flock for the present fiscal year. The daily ration before going to pasture consisted of 1½ pounds hay, 1½ pounds meal, and 4 pounds roots. (The meal mixture was as follows: Bran 200 pounds, ground oats 200 pounds, oilcake 50 pounds.) From November on they received 2 pounds meal, 1½ pounds hay, and 3 pounds roots per head per day, but it was found that the 2 pounds of meal was too much, as the ewes got too fat by lambing time.

No. of Sheep.	Period.	Hay.	Roots or Ensilage.	Meal.	Pasture.	Total Cost.
		Lb.	Lb.	Lb.	Days.	$ cts.
11	April, 1, 1915—June 3, 1915	1,040	.....	1,040	.....	19 76
11	June 3, 1915—Nov. 1, 1915	.....	.....	.....	1,661	13 75
17	Nov. 1, 1915—Dec. 1, 1915	765	1,530	1,020	.....	19 89
16	Dec. 1, 1915—Mar. 1, 1916	2,184	5,824	2,912	.....	58 24
14	Mar. 1, 1916—Apr. 1, 1916	651	1,736	868	.....	17 36
Total 14 sheep, 365 days		4,630	9,090	5,840	1,661	129 00

FINANCIAL STATEMENT.

Breed.	April, 1915.		April, 1916.		Returns including sales.	Gross returns made up of increased values and sales.
	No.	Value.	No.	Value.		
		$ cts.		$ cts.	$ cts.	$ cts.
Shropshires all ages.....	21	415 00	21	525 00	124 65	234 65

By increase in value of stock	$110 00	
By sale of breeding stock	80 00	
By value of wool at 35 cents	41 65	
By manure, 15·75 tons at $1	15 75	
		$247 40
To food consumed	$129 00	
To labour	42 48	
To loss of 3 ewes	70 00	
		241 48
Net balance from sheep		$ 5 92

EXPERIMENTAL STATION, STE. ANNE DE LA POCATIERE, QUE.

REPORT OF THE SUPERINTENDENT, JOS. BÉGIN.

SHEEP.

It is proposed to keep a fairly large flock of Shropshires at this Station and to purchase a number of ewes of mixed breeding, typical of the flocks of the locality, in order to establish a flock of grade Shropshire ewes. Thirteen ewe lambs 6 to 8 months old were purchased in the fall of 1915 for this purpose, in order to find out the improvement in production that may result from the use of a good pure-bred male on a common flock. As the space at our disposal is sufficient only for a small flock, the pure-bred Shropshire ewes will not be purchased until next year.

The flock of grade ewes is headed by a very good Shropshire ram, shipped to this Station from the Central Experimental Farm. Eight out of thirteen were served in the fall of 1915 by this excellent animal. Unfortunately, six lambs were born so weak that they died. It is believed that this failure is due largely to the fact that the ewes were kept too fat during the winter.

EXPERIMENTAL STATION, CAP ROUGE, QUE.

REPORT OF THE SUPERINTENDENT, GUS. A. LANGELIER.

SHEEP.

The flock of sheep at this Station is composed of a Leicester ram and twenty ewes, all pure bred. On account of lack of accommodation, no breeding or feeding experiment has yet been undertaken. However, a large and commodious sheep barn will be completed during the early summer of 1916, after which the registered flock will be somewhat increased. It is also proposed to carry on feeding experiments each season, to see if it would not be more profitable for the farmer of the district to keep the lambs until some time through the winter, rather than dump them all together on the market in the autumn when prices are always very low. At the same time different combinations of feeds will be tried with a view of finding out if home grown stuff alone can be used, instead of buying part of the concentrates.

Permanent pasture from a mixture of many grasses and clovers are being established and their stock carrying capacity, also profitableness, compared with annual green crops, will be studied.

There is no trouble to find a market in the district, at prices varying between $15 to $25, for all pure-bred lambs which are available for sale.

EXPERIMENTAL STATION, LENNOXVILLE, QUE.

REPORT OF THE SUPERINTENDENT, J. A. McCLARY.

SHEEP.

There are now at this Station sixty head of sheep, nine of which are registered Oxford ewes, one registered Oxford ram, forty well-graded ewes and ten shearling ewes. Grading experiments are being conducted with these grade ewes, with the object of ascertaining what improvement may be brought about by the use of the best registered sires of the Oxford breed, the proper feeding and care of the same, dipping for destruction of ticks and the careful selection each year of ten of the best ewe lambs in the flock and culling out ten of the oldest ewes of the flock.

During the early spring of 1916 one of the registered ewes died through a case of blood poisoning.

LAMB FEEDING EXPERIMENTS.

Eighty-seven grade wether and ewe lambs were purchased locally in addition to those raised from the grade flock, making a total of 133; these cost 6 cents per pound delivered at the Station.

The lambs raised on the Farm were turned into rough pasture lands during the summer, and in the first part of September they were weaned and turned into rape and clover pastures. These lambs made excellent gains, and in the late fall it was deemed advisable to sell a number of these; accordingly, 100 were sold for 8 cents per pound during the last week in November. The balance of the flock, thirty-three in number, were kept for winter feeding. It must be noted that the remaining lot of lambs were the culls of the one hundred and thirty-three lambs, and were of poor breeding. For that reason it was impossible to get gains that good well-bred lambs would have given.

These lambs were fed on a ration consisting of 2 pounds of roots, 1½ pounds of silage, 1½ pounds of hay, and half a pound of bran each per day at the beginning of the experiment, and at time of sale were receiving 3 pounds of roots, 1 pound of hay, 2 ounces of corn meal, half a pound of ground oats, half a pound of bran and 2 ounces of oil cake.

On the 26th of February these lambs were sold for 10 cents per pound, and it is pleasing to add that these lambs topped the Montreal market at time of sale.

Below is a table giving amount and cost of feed consumed by these lambs and gains obtained thereby:—

Number of lambs in the experiment	33
Value of lambs at beginning of experiment	$231 00
Cost of feeds during the experiment	90 16
Total cost	$321 16
Selling price of lambs	330 00
Net gains on lambs	8 84

Below are submitted inventories and returns for sheep on the Lennoxville Experimental Station during the year April 1, 1915, to March 31, 1916:—

FINANCIAL STATEMENT.

	April 1, 1915.		March 31, 1916.		Returns, including sales.	Gross returns, made up of increased values and sales and manure.
	No.	Value.	No.	Value.		
		$ cts.		$ cts.	$ cts.	$ cts.
Sheep all breeds and ages.....	54	541 00	60	981 00	1,314 96	1,804 96

RETURNS.

By increased value of flock..	$ 440 00
Sales of old ewes....	72 00
Sales of feeding lambs..	1,143 00
Sales of wool..	99 96
Manure, 50 tons at $1 per ton..	50 00
Gross returns..	$1,804 96

EXPENDITURES.

Purchase of breeding stock..	$ 400 00
" feeding lambs..	522 00
Feed consumed..	246 41
Loss of sheep..	79 00
Labour expended..	150 00
Gross expenditures..	$1,397 41
Net balance from sheep..	$ 407 55

EXPERIMENTAL FARM, BRANDON, MAN.

REPORT OF THE SUPERINTENDENT, W. C. McKILLICAN, B.S.A.

SHEEP.

The flock consists of the following animals on March 31, 1916:—

Oxford Down—	2 rams.
"	3 old ewes.
"	3 ewes born 1914
"	3 ewes born 1915.
Grade—	30 old ewes.
"	13 ewes born 1914.
"	17 ewes born 1915.

The breeding season of 1915 was moderately successful. Of forty-three ewes of breeding age, eleven proved not in lamb. The remaining thirty-two ewes gave birth to fifty-six lambs and raised forty-four of them; an average of 1·37 lambs per ewe.

SHEEP GRADING EXPERIMENT.

The foundation of the grade flock was a bunch of range ewes of mixed and mongrel breeding, purchased in 1910 and 1911. Since that time, pure-bred Oxford Down rams have been used, and the improvement in the size and type of the succeeding generations is most marked. Young ewes produced from two crosses of Oxford Down blood on the most ordinary foundation stock can scarcely be distinguished from pure-bred sheep. This improvement has been brought about in a short time and at small cost and could easily be duplicated on any farm.

CO-OPERATIVE WOOL-SELLING.

The 1915 wool clip was 561 pounds from sixty sheep, or 9·35 pounds per sheep. It was sold co-operatively along with that of a great many other Manitoba farmers. The Manitoba Department of Agriculture handled the wool and made the sale; the grading was done by an expert supplied by the Live Stock Branch of the Dominion Department of Agriculture. The following were the prices obtained for the various grades and the amounts of each grade in the clip from the Farm:—

Grade—Western Division.	Weight.	Value.	Amount.	
	Lb.	cts.		$ cts.
Fine Combing		25		
Fine Med. Combing		26		
Medium Combing	257	27¼		70 03
Low Medium Combing	180	27¼		49·05
Coarse Combing	35	27		9·45
Lustre Combing		27		
Fine Med. Clothing	38	25		9·50
Medium Clothing	47	25		11·75
Low Medium Clothing		25		
Fine Clothing		23		
Rejections	4	23		92
Gray and Black		23		
Washed		35		
Tags		8		
	561			$150 70
Commission at 1c per lb			$5 61	
Freight and cartage			25	
Payment in cash			144 84	
			$150 70	$150 70

This price was much better than could be obtained by farmers selling individually, and it is believed that co-operation in wool-selling is doing much to assist the sheep industry in the province.

WINTERING OF BREEDING EWES.

During the winter of 1914-15, an experiment was made comparing an open shed with a barn for the wintering of breeding ewes, and also comparing mixed hay with alfalfa. The results in regard to the health and gains of the sheep were reported in last year's report. The lambing results, not being available then, are reported herewith. Eleven ewes were not in lamb at all, but as conception took place before the lots were divided and failure in this regard could not be traced to any difference in feed or shelter, these are not counted at all. The remaining ewes gave the following lambing percentage:—

Method of Wintering.	Percentage of Lambs born.	Percentage of Lambs raised
In barn. Fed hay	175	150
In barn. Fed alfalfa	189	118
In open shed. Fed alfalfa	200	144

It is probable that the individuality of the ewes had more to do with these results than the treatment, even though they were divided as evenly as possible in regard to age, condition and breeding record. The open shed method of wintering is at least not at any disadvantage, and requires much less outlay for the buildings.

COST OF FEED FOR SHEEP.

Records are kept of the feed used by each group of sheep. These give data showing the cost of raising lambs and of keeping breeding ewes. The following statements are the averages of the total feed used by each group rather than the feed of single individuals.

Feed Used by Mature Ewe, including feed of 1·37—Lambs per Ewe up to Weaning Time.

324	pounds alfalfa hay at $12 per ton	$1 94
377	" wheat green feed at $6 per ton	1 13
39	" oats at 34 cents per bushel	39
30	" barley at 40 cents per bushel	25
69	" bran at $16 per ton	55
6	months' pasture at 25 cents per month	1 50
	Total cost	$5 76

Feed Used by Lamb from Weaning to One Year.

120	pounds alfalfa hay at $12 per ton	$0 72
282	" wheat green feed at $6 per ton	85
15	" oats at 34 cents per bushel	15
25	" barley at 40 cents per bushel	21
40	" bran at $16 per ton	32
	Total cost	$2 25

Feed Used by Lamb from One to Two Years.

492	pounds alfalfa hay at $12 per ton	$2 95
282	" wheat green feed at $6 per ton	84
19	" barley at 40 cents per bushel	16
19	" bran at $16 per ton	15
6	months' pasture at 25 cents per month	1 50
	Total cost	$5 60

Total cost of raising lamb to two years of age, $7.85.

BRANDON.

EXPERIMENTAL FARM, INDIAN HEAD, SASK.

REPORT OF THE SUPERINTENDENT, W. H. GIBSON, B.S.A.

SHEEP.

There are now one hundred and twelve sheep in the flock. The breeding flock is composed of the following:—

Shropshires: Three stock rams, seven pure-bred ewes and one pure-bred shearling ewe.

Oxfords: Two stock rams, used in crossing with range ewes.

Grades: Ten high grade Shropshire ewes, four shearling ewes and eighty-five common ewes.

Only a fairly successful year can be reported in breeding operations with sheep. Seventeen ewes gave birth to twenty-eight lambs, twenty-five of which were raised. Unfortunately, during the fall the coyotes made a raid on the flock and succeeded in killing twenty-five head. Four of these were pure-bred ram lambs, six were wether lambs, and fifteen grade range ewes.

As reported last year, one hundred ewe lambs were selected from a carload of feeders with the view of being used as foundation stock in a breeding experiment, the object being to demonstrate the influence of pure-bred sires on common range stock. These were divided into two lots and bred to Shropshire and Oxford rams. Careful records of all feed were kept in order to determine the cost of wintering ewes, shearlings and lambs from November 1, 1915, to March 31, 1916.

Cost of Wintering Ewes—		
Number of ewes in flock		17
1,717 pounds hay at $10 per ton	$	8 58
459 " pea straw at $2 per ton		45
63 " bran at $20 per ton		63
1,960 " oats at $30 per ton		29 40
Total cost	$	39 06
Average cost		2 29
Cost of Wintering Shearling Ewes—		
Number in flock		85
8,787 pounds hay at $10 per ton	$	43 93
2,295 " pea straw at $2 per ton		2 29
9,644 " oats at $30 per ton		144 66
Total cost	$	190 88
Average cost		2 24
Cost of Wintering Ewe Lambs—		
Number in flock		5
374 pounds hay at $10 per ton	$	1 87
135 " pea straw at $2 per ton		13
560 " oats at $30 per ton		8 40
Total cost	$	10 40
Average cost		2 08

EXPERIMENTAL STATION, ROSTHERN, SASK.

REPORT OF THE SUPERINTENDENT, W. A. MUNRO, B.A., B.S.A.

SHEEP.

A flock of one hundred range ewes were purchased in November. These ewes were mated to the best available Leicester rams, but as lambing is late there is yet little to report as to progress in the grading-up experiment. Data will be kept of progress in thus cheaply breeding a farm flock of desirable mutton type and also of cost of wool and mutton production.

The flock wintered well in a straw shed and promise a good crop of lambs.

EXPERIMENTAL STATION, SCOTT, SASK.

REPORT OF THE ACTING SUPERINTENDENT, M. J. TINLINE, B.S.A.

SHEEP.

A flock of 100 range ewes were purchased in November with the two-fold object of grading up a farm flock by use of pure-bred Shropshire sires, and of ascertaining the cost of maintaining the flock and the return values therefrom. The ewes were very thin at the time of purchasing, consequently the cost of feed has been much higher than it would have been had the sheep been in good condition at the commencement of the winter.

SHEEP SHED.

The sheep were wintered in a straw shed. This shed was 30 feet wide by 40 feet long, and was constructed by using cedar posts for uprights, with 4- by 6-inch stringers on top of the posts. This framework was closed in, both walls and roof, with woven wire. A large pile of straw was threshed on top of the framework and around the sides. The south end being left open. The sheep wintered splendidly in this shelter, thriving exceptionally well, the only fatalities being three lambs lost by abortion.

PLAN OF FEEDING.

During the first few days after the arrival of the flock, they were fed all the prairie hay they would clean up, with a grain ration of one-half pound per day for each sheep. As the sheep did not appear to relish the hay, a part was replaced by green oat sheaves. During the entire feeding period the sheep had access to the straw pile. Salt was also available. No charge has been made for either of these. The grain fed was equal parts oats and barley.

DAILY RATION USED.

After the sheep had become accustomed to the change in feeds the following amounts were fed to the 100 ewes, and three rams:—

Morning—
50 pounds prairie hay.
30 " mixed grain.
Noon—
15 pounds oat sheaves.
Night—
60 pounds of mixed grain.

Total Cost of Feed.

Oats—4,999 pounds at 1 cent per pound	$	49 99
Barley—4,906 pounds at 1 cent per pound	"	49 06
Prairie hay—9,162 pounds at $10 per ton	"	45 81
Oat sheaves—17,784 pounds at $10 per ton	"	88 92
Labour—1384 hours at 23 cents per hour	"	31 85
Total cost for 123 days	$	265 63
" " 1 day	"	2 16
Cost for 1 sheep per day	cts.	2·09

At the close of the fiscal year the only increase in value of the flock was three March lambs. As the ewes are in a thrifty condition a good crop of lambs is expected.

EXPERIMENTAL STATION, LETHBRIDGE, ALTA.

REPORT OF THE SUPERINTENDENT, W. H. FAIRFIELD, M.S.

LAMB FEEDING.

A lamb-feeding experiment with alfalfa was again carried out this year in conjunction with similar work with steers. In the test there are two lots, one fed a relatively short period and the other much longer. There were 479 wether lambs obtained in all, enough in each group to make a full double deck carload. The lambs were purchased through Messrs. Wade & Jack, of Calgary, from the Western Stock Ranches, Limited, at Cluny, Alta. The price paid was $5 a head for the run of the bunch. They were received at the Experimental Station on October 15 and were allowed to run on stubble until November 18, 1915.

As has been the case with the previous lamb-feeding experiments on the Station the primal object has been in each case to determine the feasibilty of disposing of alfalfa hay by feeding it on the farm. Throughout the feeding test the only roughage used has been alfalfa hay. It was only fair in quality, although not coarse and the leaves were pretty well retained, still the colour was badly off owing to the difficulty of curing hay well during the wet summer of 1915.

OUTLINE OF EXPERIMENTS.

The feeding test was begun on November 18 when the lambs were divided as nearly as possible into two equal lots so far as size and quality were concerned. The initial weight was obtained by taking the average weight for three consecutive days, i.e., November 17, 18, and 19. They were fed twice a day in combination racks similar to the one shown in illustration and were always given as much alfalfa hay as they would clean up. For twelve days they were fed on hay with no grain. The grain fed was equal parts of barley and oats fed whole. In starting to feed grain but 2 ounces per head was given. The increase was made gradually at the rate of between 2 and 3 ounces a week. Group 1 was increased until it was on full feed, that is, fed all that they would eat up clean, which was found to be 1¾ pounds per head per day. Group 2 received about half this quantity up until the time group 1 was sold. Both lots had access to water at all times. A tank warmer was used to keep the troughs open; ice formed around the edges. They were fed in corrals with an open shed sheltering them on the west.

COST OF FEED.

A value of $12 per ton was put on the alfalfa hay fed and $20 per ton (or 1 cent per pound) on the grain fed. To make the results in dollars and cents comparable with the tests carried on previously the same value for the feed has been used each year. This season the price of $12 per ton is considerably more than alfalfa is worth.

SALE.

The first group was sold to Gainers, Limited, South Edmonton, on the first and delivery was taken on the 7th of March. Sealed tenders were asked for and of the five bids received Gainers' was the highest. The price received was $9.72 per 100 pounds, weighed at the Lethbridge stockyards without shrink.

The following table gives detailed information regarding the test:—

Sheep Feeding Experiment, 1915-16.

	Group 1.
Number of lambs in lot at beginning of period	237
" days in experiment	110
Total weight at beginning of experiment..lb.	16,175
Average weight at beginning of experiment.. "	68·25
Total weight at end of period.. "	23,678
Average weight at end of period.. "	99·91
Gain for period.. "	7,503
" per head for period.. "	31·66
" per head per day.. "	·29
Quantity of grain fed to lot for period.. "	25,995
" alfalfa hay fed to lot for period.. "	58,280
" salt fed to lot for period.. "	158
Total cost of feed for period.. $	611 21
Cost of feed per head for period.. "	2 58
" " " per day..cts.	2·3
" to produce one pound gain.. "	8·1
Original cost of lambs.. $	1,185 00
" plus cost of feed.. "	1,796 21
Selling price at $9.72 per cwt. less half of 1 per cent insurance and 3½ per cent shrink.. "	2,213 78
Net profit on group.. "	417 57
" per head.. "	1 76

Referring to the last three items in the above table it will be noticed that a 3½ per cent shrink is mentioned. The lambs were weighed on the Station scales and were driven about two miles to the public stockyards asd were weighed again, this latter weight being the one on which they were sold (without shrink) but the difference in weight from the Station to the stockyards amounted to 3½ per cent.

THE FINANCIAL SIDE.

Below is given a financial statement. It will be noticed that 239 lambs are charged up, while only 237 started in the feeding test. The two lambs referred to were lost while running on the stubble.

No account is taken of labour, as it is difficult in experimental feeding where great care must be used in getting the exact weights of feed given, etc., to arrive at anything approaching a fair and reasonable charge for this item. However, the alfalfa fed is put in at a high enough value so that a farmer can well afford to feed. The labour necessary in feeding when a good-sized bunch of lambs are used would certainly not be greater than if a farmer had to bale the same hay and deliver on cars.

Financial Statement.

Cost of lambs (239)..	$1,195 00	
Freight and feed in transit to Lethbridge..	35 95	
Cost of feed, including salt..	611 21	
Interest on investment (6 months at 8 per cent)..	49 24	
Selling price..	.....	$2,213 78
Net profit..	322 38	
	$2,213 78	$2,213 78

Net profit per head, $1.35.

THE NET PROFIT.

As will be noticed, a net profit per head of $1.35 is indicated after charging everything except labour. It is well to point out that should a farmer come out even with no net profit he would still be disposing of his alfalfa hay at a good price ($12) and have the manure left on the farm which in the long run is a point that is worth considering. The net profit is his leeway for protection in case he should buy on a high market and happen to sell on a weak one.

Lot 2 at the time lot 1 was disposed of were receiving 1 pound of grain per head per day. They were sheared March 31. The average weight of fleece was 5·6 pounds. They will be fed at least four or five weeks longer.

LETHBRIDGE.

EXPERIMENTAL STATION, LACOMBE, ALTA.

REPORT OF THE SUPERINTENDENT, G. H. HUTTON, B.S.A.

SHEEP.

The eighteen common grade ewes carried over the winter of 1914-15 raised twenty-four lambs, an increase of 133 per cent. There have been losses during the year, in one instance due to disease and in other instances to the depredations of coyotes. There are on hand at present sixteen common grade ewes, twenty-two lambs and one ram which is a pure-bred Shropshire and the sire of the lambs. The lambs were born in April, and in late October weighed an average of 86 pounds each at the time their dams weighed 120 pounds. It is expected that the lambs will show an increase of 20 pounds at least over the weight of their dams at the same age which increase can be credited to the use of a pure-bred sire. The first clip of wool from these lambs will be taken shortly and the weight and quality compared with that from their dams.

The cost of carrying such a small flock of sheep as is being kept at this Station is practically negligible for the reason that they consume a great deal of food that would otherwise be waste and manage to obtain their living for the greater part of the year without being fed directly since they act as gleaners of the food given other stock.

The estimate given as to the cost of feeding during the winter of 1914-15 was 2 cents per head per day. We are inclined to qualify this estimate downward particularly when prairie hay is available at $2.50 to $4 per ton. Wool sold last year at 29 cents per pound and the average fleece approximated 10 pounds. Thus the return of these sheep in the past two years for wool alone has been almost $5 per head.

EXPERIMENTAL FARM, AGASSIZ, B.C.

REPORT OF THE SUPERINTENDENT, P. H. MOORE, B.S.A.

SHEEP.

During the year considerable increase has been made in the flock of Dorset horned sheep. Some common grade and one cross Dorset horned sheep have been added to the flock which now numbers fifty head besides lambs. There has not been any loss from disease, wild animals, or dogs during the year, although dogs are the most dreaded enemy.

A much-needed sheep barn was started and made habitable for winter use. This improvement, even in the present state, was a great advantage to the flock, especially in the extremely bad winter just experienced.

Mr. Alex. McKay, farm foreman, continued to take charge of the sheep this year and the condition of the flock testifies to his ability as a shepherd.

The past winter has made 1915-16 one of the most expensive years in the history of the farm for the maintaining of sheep. In 1914-15 the flock ran to pasture during the entire year and obtained food which would otherwise have been wasted. This year stable feeding commenced on December 24, 1915, and there was not a pound of food gathered by the flock until April, 1916. This made a feeding period of 100 days. The sheep were fed on mixed hay, mangels, and grain mixture made of 200 pounds wheat bran, 200 pounds ground oats, barley, and peas, and 50 pounds linseed oilcake. The whole flock received a half pound per head per day at the start. After March 10 the coming yearlings, which were to be bred in the spring, received 1 pound per day each. The old ewes were increased to 1 pound per day about two weeks before lambing. The average for the whole flock per head was as follows:—

200 pounds	mixed hay	$1 00
600 "	mangels	1 20
70 "	mixed grain	84
	Total cost	$3 04

This is at least three times the cost for an average year.

The yield of wool was fair this year. The gross returns per sheep were not as heavy as in seasons when there was less rain in February and March. This season there was nearly four times as much rain in March as the average for the past twenty-four years. The sheep were never dry during the month, and on being dried out to be shorn the wool was noticeably lacking in grease. The average clip in the spring of 1915 was 8 pounds per sheep. The sheep appeared to carry heavier fleeces this spring but the average was only 7·03 pounds for the pure breds, 6·54 pounds for the grades, 7·06 for the first cross of Dorset on the grades. The wool is being graded and sold along with that of the Island Flock Masters Association, Duncan, V.I., B.C.

The lambing results this year are quite satisfactory and a vast improvement over that of 1914, when the ewes were too fat. The results are as follows:—

14 pure-bred ewes dropped 25 lambs, 22 alive, 21 living.
7 first cross ewes dropped 10 lambs, 9 alive, 9 living.
10 grade ewes dropped, 12 lambs, 12 alive, 12 living.

Showing pure-breds dropping 178 per cent, alive 157 per cent and healthy and strong 150 per cent; first cross dropping 142·8 per cent, 128·5 per cent dropped alive,

and all doing well; grades dropping 120 per cent lambs, all of which were dropped alive and are still living and strong.

A few production records are here given of some of the pure-bred ewes showing the inheritance of a few characters by the offspring, especially in fecundity and wool production.

Ewe No. 41.

Wool Production.	Date.	Lambed.	No.	Sex.
5·25 lb.	1911	No ram to breed here till autumn 1911		
5·25 "	1912	Feb. 8 1912.	1	Ram.
		Sept. 6, 1912.	2	1 ram, 1 ewe.
4·5 "	1913	Mar. 31, 1913.	1	Ewe.
3·7 "	1914	Feb. 15, 1914.	2	Ewes.
4·5 "	1915	April 16, 1915.	2	1 ram, 1 ewe.
4·0 "	1916	Mar. 12, 1916	2	Ewes.

Ewe No. 71. Daughter of 41. Dropped Sept. 6, 1912.

5 lb.	1914	Feb. 24, 1914	1	Ram.
6 "	1915	May 4, 1915	2	1 ram, 1 ewe.
4 "	1916	Mar. 5, 1916	3	Rams.

Ewe No. 86. Daughter of 41. Dropped March 31, 1913.

6·0 lb.	1914	April 16, 1914	1	Ewe.
7·0 "	1915	April 14, 1915	3	1 ram, 2 ewes.
4·9 "	1916	Feb. 22, 1916	3	Ewes.

Ewe. No. 91. Daughter of 41. Dropped Feb. 15, 1914.

8·0 lb.	1915	April 28, 1915	2	1 ram, 1 ewe.
5·3 "	1916	Feb. 19, 1916	2	Rams.

	Ewe Number.			
	41.	71.	86.	91.
Age, shears	6·0	3·0	3·0	2·0
Average wool per shear.....lb.	4·53	5·0	6·0	6·65
Average number lambs per birth	1·66	2·0	2·3	2·0

This ewe (No. 41) is not very large and is of decided dairy conformation. She carries an enormous udder for her size, gives a large amount of milk, and always raises very large, fat lambs to weaning time. Regardless of the ram used the ewe lambs all resemble the dam in appearance. They are all heavy milkers, prolific, and light wooled. In four years from the first lambing this old ewe has eleven living descendants in the flock and twenty-seven descendants altogether, male and female.

AGASSIZ.

In contrast to this is another type of profitably prolific, mutton type, and heavy wooled, as represented by No. 72. Sheep of this type form the larger part of the flock.

Ewe No. 72. Dropped January 31, 1913.

Wool Production.	Date.	Lambed.	No.	Sex.
10·5 lb.	1914	April 12, 1914	2	Ewes.
9·5 "	1915	Jan. 21, 1915	1	Ewe.
		Nov. 12, 1915	2	Ewes.
8·2 "	1916	Will lamb in Sept.		

Average wool per shear, 9·4 pounds.
Average lambs per birth, 1·66

RAPE FOR FATTENING LAMBS.

A trial was made with the ram and wether lambs for early autumn fattening on rape. The trial is not a true comparison between rams and wethers because the best males of the flock were kept as rams and the poorest ones were castrated when they were quite young. The lambs were pure-bred Dorset Horned, lambed in April and May.

The rape was only a fair crop and 1 acre would only support eleven lambs for fifty-four days. The lambs were run fourteen days without grain. They were then given 1 pound each per day of a mixture of 100 pounds whole oats, 50 pounds crushed barley, 25 pounds oilcake (linseed), and 25 pounds corn meal. The labour of feeding once per day did not amount to more than 10 minutes per day. The following figures illustrate the results obtained in this trial:—

		Rams.	Wethers.
Average age when weaned and put on rape. Days		130·0	118·4
Number of lambs per acre		11·0	11·
Number of days on trial		54·0	54·
Number of days fed grain		40 0	40·
Average weight when put on rape	lb.	98·25	81·8
Average weight when finished	"	127·5	106·28
Total gain in weight per lamb	"	29·25	24·48
Average daily gain per lamb per day	"	0·54	0·453
Pounds grain consumed per lamb		40·0	40·0
Grain consumed per pound gain		1·36	1·63
Cost of grain per pound gain	cts.	1·9	2·28
Total gain from 1 acre of rape and 440 pounds of grain	lb.	321·75	269·28
Value of lamb produced per acre at 7·5cts.	$	24·13	20·19
Value of grain used per acre	"	6·16	6·16
Value of an acre of rape	"	17·97	14·03
Cost per pound gain. Rent, $9 per acre	cts.	4·6	5·6

Some lambs were put on pasture after the trial was finished and fed the same grain ration. Up to sixty days they did not gain, but at ninety days they lost weight as compared to that when they finished the rape pasture.

With the increased flock and accommodation much more work will be done the coming year.

SWINE

CENTRAL EXPERIMENTAL FARM, OTTAWA, ONT.

REPORT OF THE DOMINION ANIMAL HUSBANDMAN,

E. S. ARCHIBALD, B.A., B.S.A.

There are 171 head of swine of all breeds and ages now on the Central Experimental Farm. This number is forty-nine head less than reported a year ago, the decreased numbers being due wholly to the lateness of the crop of pigs this spring. All these pigs are used for experimental breeding, feeding, and housing, as well as for sales of high class breeding stock, at a reasonable figure. The breeds kept are Berkshires, Tamworths, and Yorkshires.

The Berkshires number thirty-four head, and include thirteen brood sows, nineteen young pigs, and two boars.

The Tamworths number twelve head, including seven brood sows, four young pigs, and one boar.

The Yorkshires number 125 head, and include thirty-nine brood sows, fifty-four young pigs, four boars, and twenty-eight feeders which are nearly ready for the market.

The housing of brood sows during both winter and summer in the single-board cabins has been conducted as in past years. The main piggery continues to give good satisfaction both for experimental feeding and also in its use for the farrowing season.

More each year the limitations of the small area devoted to pigs hinder the expansion of this work to the proportions necessary for meeting the demands of the farmers. The comparing of dry lot feeding with pasturing, the comparing of pail feeding with the self-feeder, and all similar problems of economic value to the Canadian farmers, who at the present time are facing a great shortage of labour, are problems which can only be dealt with when an increased area for this branch is provided.

The increased sales of breeding stock and the demand from individual farmers and agricultural societies for such may again be reported, and may be taken as an indication of the good stock previously sold from this Farm, as well as of an added interest in the swine industry.

The many experiments conducted during the past year in the feeding of pigs of different ages and under different conditions were under the personal supervision of Mr. G. B. Rothwell. The detailed reports of these experiments were compiled by him, and are given herewith.

EXPERIMENT No. I.

Summer Feeding of Shoats in Outside Paddocks.

OBJECTS OF EXPERIMENT.

1. To determine the best methods to be employed in the summer feeding of young pigs 10 weeks of age and over, where they had been thoroughly weaned from the sows at the commencement of the experiment.
2. To determine the value of green feed in the summer feeding of pigs.
3. To determine the value of the hopper grinder (hog motor) and the self-feeder.

PLAN OF EXPERIMENT.

Lot I received a grain mixture composed of equal parts of shorts, ground oats, and finely ground barley, plus skim-milk.

Lot II received the same grain mixture, plus skim-milk, plus all the green feed (clover) which they would clean up.

Lot III were fed whole barley in the hopper grinder. Aside from this, they were fed a meal mixture composed of equal parts of shorts and oats, getting the same number of pounds of each of these as they consumed of barley from the hopper grinder. They also received the same quantity of milk as lots I and II.

Lot IV received a grain mixture composed of equal parts of shorts, fine ground oats, and fine-ground barley, fed dry once per week in a self-feeding hopper. The pigs received all the meal they would thus consume. Skim-milk was fed separately in same quantity as lot I.

WEIGHTS.

All feeds were accurately weighed.

Individual weights of pigs were taken at the beginning of the experiment and at the end of each fortnight for twelve weeks.

QUALITY OF PIGS IN THE FOUR LOTS.

Lots I, II, and IV, containing nine, eight, and nine pigs, respectively, were, as the table indicates, almost uniform in weight. With a few exceptions in each lot they were good types of feeders but, outside of the exceptions mentioned, not of sufficiently good quality for select breeding stock.

Lot III, on the other hand, was made up of eight individuals previously selected for breeding purposes, six Berkshires and two Tamworths, from 4 to 5 weeks older than the pigs in lots I, II, and IV. Berkshires were chosen for work with the hopper grinder, in order that the necessary exercise might overcome the tendency of this breed to become sluggish and over-fat.

PRICES OF FEED USED IN EXPERIMENT.

Meal	per ton.	$26 80
Green feed	"	3 00
Skim-milk	cwt.	15

SWINE FEEDING EXPERIMENT No. III.

SUMMARY.

Object of Experiment.—To determine best methods of summer feeding young pigs 10 weeks of age and over.

Lot.		1	2	3	4
Feed Given.		Shorts, Gr. Oats Gr. barley equalparts plus skim-milk.	Same grain as Lot I plus skim-milk plus green feed.	Whole barley in grinder plus supplement.	Meal mixture fed in self-feeder plus skim-milk.
Number of animals in each group	No.	9	8	8	9
First weight, gross, July 1, 1915	Lb.	221	229	513	220
First weight, average	"	24·5	28·6	64·1	24·4
Finished weight, gross, Sept. 23, 1915	"	1026	983·	1273	975·
Finished weight, average	"	114	122·9	159	108·3
Number of days in experiment	No.	84	84	84	84
Total gain for period	Lb.	805	754	760	755
Average gain per animal	"	89·4	94·2	95	83·9
Average daily gain for group	"	9·58	8·98	9	8·99
Average daily gain per animal	"	1·06	1·12	1·12	·999
Quantity meal eaten by group for period	"	1740	1497	2250	1650
Quantity green feed eaten by group	"	.....	1040	.....	.....
Quantity skim-milk eaten by group	"	3250	3237	3329	3274
Total cost of feed	$	28·18	26·47	35·14	27·02
Cost of feed per head	$	3·13	3·31	4·39	3·00
Cost of feed per head per day	cts.	3·72	3·94	5·22	3·57
Cost in feed to produce 1 pound gain	"	3·5	3·51	4·6	3·58

Throughout the experiment the results of which are above outlined the health of the animals in all the lots was excellent and only one feature of the routine may have had an influence on the final weights. The experiment, originally planned to extend over ten weeks, was prolonged an extra two weeks due to the fact that the pigs in lots I, II, and IV were rather younger at the start than was desired. During this extra two weeks the regular supply of barley became exhausted, with the result that it was replaced by barley of a very inferior quality. Lot III, which ground their own grain, were particularly affected and made their lowest fortnight gain in this period, while lot IV, consuming the dry mixture, also showed a disinclination to feed heartily, with a consequent falling off in gain. The meal used with lots I and II, fed as a slop, was apparently little affected in palatability, due probably to the influence of the skim-milk. In lots I, II, and IV the cost to produce will be seen to be practically the same, lot I making a shade cheaper gains. Lot III consumed considerably more meal, and as has been shown, were older pigs. Giving due importance to the latter fact, the cost to produce 1 pound gain is comparatively high. As to how they would have fared if forced to subsist from the Hog motor alone is conjectural. Lot III required 80 pounds more meal and 35 pounds more milk than lot I to make 100 pounds gain. Previous trials had very clearly shown that for young pigs the grinder is at least a doubtful, if not a fatal, acquisition. Although every precaution was taken to ensure maximum easy running qualities in the machine, it nevertheless proved very difficult for the pigs to operate.

Compariug Lots I and II it is seen that 139 pounds meal has the same value as 1112 pounds green feed plus 227 pounds skim-milk. At the above values for meal

and skim-milk, green feed (green-cut alfalfa) thus has a value of $2.62 per ton. Although this appears low when compared with some past experiments, yet in reality such a value yields a good revenue on the alfalfa field.

One of the most interesting comparisons afforded by the experiment is that shown between lot I (fed shorts, oats, and barley in equal parts, mixed with skim-milk as a slop) and lot IV (fed a similar mixture dry in a home-made self-feeder, with skim-milk supplied apart). These lots weighed into the experiment at 221 and 220 pounds, respectively, and were as uniform in other respects as was possible. At the end of the period Lot I had made 50 pounds greater gain and had consumed 90 pounds more meal. In other words, lot IV required 3 pounds more meal and 30 pounds more milk to make 100 pounds gain than did lot I. Leaving cost of labour aside, this resulted in slightly cheaper gains by lot I. To feed lot I, however, required on an average of twelve minutes per day under existing conditions, while to feed lot IV required only six minutes per day, the feeder being filled every two weeks and the balance of the ration consisting of skim-milk. Figured at 20 cents an hour, this would reverse the slight advantage of lot I in the first comparison as to cost of gain. As previously mentioned, lot IV on the self-feeder was at a disadvantage during the last two weeks due to an inferior quality of feed.

While no very definite superiority one way or the other can be shown, possibilities for the self-feeder are evident. With pigs on a fair range of clover or alfalfa, receiving skim-milk two or three times daily and obtaining their meal ration at will from a feeder, cheap gains might be expected. Where water could be partaken of either from a stream or some form of self-feeding watering device making use of a small tank reservoir, the cost of production and gains could be undoubtedly still further reduced. The pigs in lot IV in this experiment just described received no green feed whatever, depending solely on the meal mixture derived from the feeder, and on the skim-milk supplied.

PLAN OF SELF-FEEDER.

While there are several types of hopper feeding devices in use, any one of which can be built cheaply at home, the one shown herewith has proven quite satisfactory and has one or two points in its construction worthy of notice.

Any such device to be successful should be strong, capacious, portable, cheap, easy to construct, weather-tight, easy to regulate for different textured mixtures, and, most important of all, so arranged that the contents will feed into side troughs without any stoppage caused by the "bridging" or blocking of the contents of the hopper.

Referring to the diagram and plate, it will be seen that the feeder illustrated includes nearly all of these desirable features. Particular attention might be drawn to the gate or regulating board. The pigs in nosing against this board—which being held only by the sides at each end is more or less flexible—ensure a continuous flow of meal, as required; the mechanical result being similar to that derived by the use of the agitator, or shaker, often necessary in various types of machinery. While self-feeders are commonly built with a double-pitch roof, one half of which opens to permit of filling the hopper, the objection to such an arrangement is the liability to leak at the peak or hinge in wet weather, causing the meal to cake and clog. Consequently the feeder shown was built with a shed roof and a side door, which proved dry in all weather.

A minor difficulty was met with in the pigs standing in the trough, due to the latter having been built large enough for mature animals. For young pigs the trough should be considerably narrowed, preferably with the trough-front slanted toward the bottom. Even with the large trough, however, the waste throughout the season was practically negligible, at any rate considerably less than with the slop-fed pigs.

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SUMMER FEEDING EXPERIMENT No. 2.

GRAINS FOR SUCKING AND WEANING PIGS.

Before reviewing the results of this experiment, readers are particularly referred to the Report of the Dominion Animal Husbandman for 1914-15, in which is reported the result of similar work conducted in the summer of 1914, and to the report of 1904, when investigation work closely related to the foregoing, and of comparative value, was carried on.

OBJECTS OF THE EXPERIMENT.

1. To determine a good ration for young pigs as soon as they start eating until they are three months of age.
2. To compare oil meal and tankage in such a ration.
3. To determine the value of skim-milk as compared with tankage in this ration.
4. To compare single meals versus a mixture of two and three meals with and without skim-milk in the feeding of young pigs previous to and directly after weaning.

The objects enumerated, it will be noticed, were precisely similar to those of the experiment conducted in 1914, with this difference, however, that in 1914 corn was used as a basis for the various rations, while in 1915, for purposes of economy and comparison, barley was substituted.

PLAN OF EXPERIMENT.

The work was carried on in the outside feeding paddocks where the pigs had the shelter of the single-board hog-cabins.

The following table shows certain facts and figures necessary to a proper understanding of the plan of experiment:—

Lot.	Breed.	No. in Litter.	No. raised.	Condition throughout experiment.	Ration.
Lot 1.....	York.....	14	10	Very good.....	Finely ground Barley—3 pts. Shorts—3 pts. Oil Meal—1 pt. } plus skim-milk
Lot 2.....	Berk.....	8	8	Good.....	Finely ground Barley—3 pts. Shorts—3 pts. Tankage—1 pt. } plus skim-milk
Lot 3.....	York.....	12	8	Fair.....	Finely ground Barley—6 pts. Tankage—1 pt. } plus skim-milk
Lot 4.....	Berk.....	10	9	Fair.....	Finely ground Barley—6 pts. Tankage—1 pt. } no skim-milk
Lot 5.....	York.....	12	11	Very good.....	Finely ground Barley plus skim-milk

Valuation of Food-stuffs.

Barley	$28 00 per ton.
Shorts	25 00 "
Oil cake meal	35 00 "
Skim-milk	15 per cwt.
Swift's Digester tankage	50 00 per ton

SWINE Feeding Experiment No. 2, Experimental Farm, Ottawa.

Lot.	1	2	3	4	5
Feed Given.	Barley 3 pts Shorts 3 " Oil Meal 1 " plus sk.-m.	Shorts 3 pts. Barley 3 " Tankage 1 " plus sk.-m.	Barley 6 pts Tankage 1 " plus skim-milk	Barley 6 pts Tankage 1 "	Barley plus Skim-milk
Number of animals in each litter ....No.	10	8	7	9	10
First weight, gross (date July 12, 1915).....lb.	216	172	114	144	170
First weight, average..... "	21·6	21·5	16·3	16·	17·
Finished weight, gross (date Oct. 4, 1915)..... "	1,028	617	684	507	901
Finished weight, average..... "	102·8	77	97·7	56·3	90·1
Number of days in experiment .....No.	84	84	84	84	84
Total gain per period.....lb.	812	444·5	570	392·5	731
Average gain per animal..... "	81·2	55·6	81·4	43·6	73·1
Average daily gain for group..... "	9·66	5·3	6·8	4·67	8·7
Average daily gain per animal..... "	·96	·66	·97	·52	·87
Quantity meal eaten by litter for period..... "	1,330	845	927	1040	1,182
Quantity skim-milk eaten by litter for period..... "	3,863	3,264	3,320	.....	3,659
Total cost of feed.....$	14·14	17·48	19·44	16·22	22·17
Cost of feed per head.....$	2·41	2·19	2·78	1·80	2·21
Cost of feed per head per day.....cts.	2·87	2·6	3·30	2·14	2·63
Cost to produce 1 pound gain..... "	2·97	3·93	3·41	4·1	3·

COMPARISON of Standing of Groups, fed in 1914-15.

	Greatest total gains.					Cheapest gains.				
	1st	2nd	3rd	4th	5th	1st	2nd	3rd	4th	5th
Summer 1914 (corn basis) lot.....	3	2	1	5	4	1	5	3	4	2
Summer 1915 (barley basis) lot.....	1	5	3	2	4	1	5	3	2	4

In greatest total gains the lots of the two experiments show little similarity in standing. Lots 4, or those receiving the corn-tankage and barley-tankage rations without skim-milk, stand last in each case.

In cheapness of gain, however, which is the really important comparison, the two experiments show a marked similarity with the exception of the fourth and fifth standing, in which the respective lots are reversed.

(1) Comparing lots 1 and 2 it is apparent that, with the weights and condition of the pigs practically equal at the commencement, and the factors identical throughout the experiment, oil meal was responsible for much heavier gains than tankage. In 1914 the two rations gave practically identical results.

(2) Comparing lots 2 and 3 it is shown that the elimination of shorts and the replacement with barley showed increased gains. This is in accordance with last year's findings, and may in part be explained by the fact that lot three in both cases consumed more meal and skim-milk.

(3) Comparing lots 3 and 4 the economy of an addition of skim-milk to the barley, tankage ration, is apparent both from the standpoint of total gains and cost to produce.

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(4) Comparing lots 3 and 5 this experiment would show that tankage added to a barley and skim-milk ration resulted in considerably less total gains and considerably greater cost to produce. As will be discussed more fully, lot 5 made phenomenally good gains. In 1914 the tankage-fed lot made greater but slightly more expensive gains.

(5) Comparing lots 4 and 5 tankage makes indeed a poor showing in comparison with skim-milk, both fed with barley. With the two lots, almost equal in average weights at the commencement, the skim-milk fed pigs showed 80 per cent greater gains at the finish. Naturally the cost to produce with lot 5 is greatly lessened, even considering the higher total cost to feed.

CONDITION OF LITTERS AT FINISH OF EXPERIMENT.

The pigs of lot 1, at the finish, and throughout the experiment, were healthy, thrifty, hearty feeders, and with one or two exceptions, Yorkshires of the highest type. They were eventually sold or selected for breeding purposes.

Lot 2 did not show the same finish or general thrifty growth as did lot 1. They were, however, healthy throughout and several were classed as good breeding stock.

Lots 3 and 4 particularly during the primary and intermediary stage, compared poorly with lots 1 and 2. Particularly with lot 4, the pigs were rather stunted, lacked capacity, and showed by their hair, bone, and generally more or less unthrifty appearance, that their ration was not one likely to finish prime hogs at an early age. The only casualty of the summer's work occurred in lot 3, where one pig, showing no previous indication of trouble, was found dead in the morning. A post-mortem examination revealed nothing that might be attributed to the ration.

Lot 5 during the initial stages of the experiment were unthrifty to a typical degree, hump-backed, constricted back of the shoulders, and with long, coarse, upstanding hair. Their gains, subsequently, as shown in the last two fortnightly weighing periods, however, were the best of the five lots. Their appearance at the finish was that of the thrifty feeder, except that they still showed a considerable growth of hair. The barley used during the first two weeks was not ground sufficiently fine, and apparently proved unpalatable and less easily digestible with lot 5, where it was of course fed unmixed with other meals. This fault subsequently corrected, the pigs made most economical gains, standing second to lot 1 in cost to produce.

In general, the results of this experiment were satisfactory. Even with all feeds figured at actual buying prices, the cost to produce was low, in all cases. The results of the two years' work, however, would indicate on comparison, the advisability of another summer's work along precisely similar lines, in view of the importance to the swine breeder of well-founded information concerning the economical raising of young pigs.

EXPERIMENTS Nos. 1 AND 1A, WINTER 1915-16.

The winter feeding work with swine took the form of an experiment in duplicate, with objects similar to those of experiments carried on with dairy cattle and sheep. A brief outline of the work is as follows:—

Objects of Experiment.—With relation to the feeding of growing pigs:—

(1) To compare the value of various meals from the basis of protein content.

(2) To compare with concentrates already well established, two meals recently introduced into Canada.

(3) To gain further information regarding the effect of feeding cottonseed meal to swine.

(4) To discover and compare the palatability, digestibility, and economy of all of the meals alluded to.

Plan of Experiment.—The work was conducted with eleven groups of pigs, consisting of five groups in duplicate with the eleventh as per table.

Each group contained five pigs, as follows:—

Lots 1, 2, 3, 4, 5, and 6 of pigs from 4 to 6 months of age.

Lots 1a, 2a, 3a, 4a, and 5a (duplicates) of pigs from 2 to 3½ months of age.

Each lot was selected with strict attention to uniformity.

MEAL RATIONS.

Lot	Meal	Lb.	Shorts	Lb.	Ground barley	Lb.
1	Ground corn	200	Shorts	400	Ground barley	400
1a	" "	200	"	400	" "	400
2	Gluten feed	200	"	400	" "	400
2a	" "	200	"	400	" "	400
3	Cottonseed meal	125	"	400	" "	400
3a	" "	125	"	400	" "	400
4	Linseed oil cake	170	"	400	" "	400
4a	"	170	"	400	" "	400
5	Peanut oil meal	110	"	400	" "	400
5a	" "	110	"	400	" "	400
6	Fish meal	85	"	400	" "	400

Skim-milk was fed with all of the above meal mixtures.

Plan of Feeding.—After the various lots were selected and placed in their respective feeding pens they were fed for one week on the same grain ration as they had previously received, this period being considered as preparatory, or to accustom the individuals of the lots to each other and to change of quarters, before any change in the feeding was begun.

Weights.—Each pig was weighed individually.

Each pig was weighed at the end of the preparatory period, this weight being considered as the first weighing, and subsequently at the end of each two weeks.

Duration of Experiment.—Lots 1 to 6 containing the older pigs were fed and weighed as outlined until they were considered fit for marketing. The feeding of lots 1a to 5a (duplicates) containing the younger animals, was continued after the disposal of the older lots, until the former were similarly fit for sale.

Valuation of Foodstuffs.—The prices charged for the various feeds were as follows:—

	Per Ton.
Corn	$32 00
Gluten feed	32 00
Cottonseed meal	33 00
Linseed oil meal	38 00
Fish meal	80 00
Peanut oil meal	40 00
Shorts	23 00
Barley	30 00
Skim-milk	4 00

Swine Feeding Experiment No. 1.

Lot.		1.	2.	3.	4.	5.	6.
Feed given.		Gr. corn, shorts gr. barley and skim-milk.	Gluten feed, shorts gr. barley and skim-milk.	Cottonseed meal shorts, gr. barley, and skim-milk.	Linseed oil cake, shorts, gr. barley, and skim-milk.	Peanut oil meal shorts, barley and skim-milk.	Fish meal, shorts gr. barley and skim-milk.
Number of animals in each group	no.	5	5	5	5	5	4
First weight gross (November 16, 1915)	lb.	675	675	429	480	377	531
First weight average	"	135	115·2	85·8	96	75·4	132·7
Finished weight gross (January 11, 1916)	"	985	906	783	829	606	775
Finished weight average	"	197	181·2	156·6	165·8	121·2	193·7
Number of days in experiment	dys.	56	56	56	56	56	56
Total gain for period	lb.	310	330	354	349	229	244
Average gain per animal	"	62	66	70·8	69·8	45·8	61
Average daily gain for group	"	5·5	5·9	6·3	6·2	4	4·4
Average daily gain per animal	"	1·1	1·19	1·26	1·24	·8	1·1
Quantity meal eaten by group for period	"	743	714	608	619	583	645
Quantity milk eaten by group for period	"	1,450	1,450	1,236	1,390	1,271	1,242
Total cost of feed	$	13·14	12·74	10·13	11·32	10·00	11·51
Cost of feed per head	$	2·63	2·55	2·03	2·26	2·00	2·88
Cost of feed per head per day	cts.	4·7	4·5	3·6	4	3·6	5
Cost to produce 1 pound gain	"	4·2	3·8	2·8	3·2	4·3	4·7
Nutritive ratio of meal mixture		1: 6·56	1: 4·81	1: 4·30	1: 4·11	1: 4·06	1: 4·18

The conditions as found in each lot throughout the experiment are herewith briefly discussed:—

Lot 1, fed corn, shorts, barley, and skim-milk, were the oldest and heaviest pigs in the test, and to this fact may be partially due the relatively higher cost per pound gain. Their gains were uniform and health excellent throughout the test, all five finishing as prime bacon hogs.

Lot 2, fed gluten feed, shorts, barley, and skim-milk, was practically similar, in comparing results obtained, to lot 1, although when finished they were not so uniformly excellent as was the case with the latter.

Lot 3 was made up of five very uniform Berkshires, fed on cottonseed meal, shorts, barley, and skim-milk. In view of the feeding proclivities of this breed and of the doubtful value of cottonseed meal in swine feeding, particular care was taken to avoid overfeeding and any possible digestive trouble due to this cause. Their relatively high gain and low cost of production are both interesting in relation to the general opinion held by practical and scientific feeders concerning the value of cottonseed meal. Henry, in his volume "Feeds and Feeding," treats with the question generally, as follows:—

> "Cottonseed meal is particularly fatal to swine. Pigs getting as much as one-third of their concentrates in the form of cottonseed meal thrive at first, but after 5 or 6 weeks, or sometimes earlier, they quite frequently show derangement and may die. Restricting the allowance of meal, keeping the animals on pasture, supplying succulent feeds, or souring the feed may help, but no uniformly successful method of feeding cottonseed meal to swine has yet been found.
>
> "As now prepared, cottonseed meal is poisonous to swine. All the various proposed ways for safely feeding this meal have failed under careful and continued tests. Pigs die—not all, as a rule, but so many that all possible profits from the use of this feed are lost. A few feeders continue to use the meal, experience enabling them to avoid most of the losses. If cottonseed meal is not fed continuously for over 40 days and does not form over one-fourth of the ration, and if the pigs are freely supplied with green forage or grazed on pasture, the risk from this feed is slight.
>
> "It is not entirely safe to place pigs with fattening cattle that are being fed cottonseed meal. Whether the trouble come to the pigs from working over the droppings of the steers or from eating the meal which falls from the feed boxes is not definitely known. Now that the nature of the poison in the cottonseed meal is known it is reasonable to expect that ere long a way be found to use this otherwise most valuable feed safely for swine feeding."

The pigs in lot 3 were fed for fifty-six days, the proportion of cottonseed meal being 13·5 per cent, or slightly less than one-seventh of the total meal ration. In this instance the stated proportion was apparently at least partially responsible for the cheapest gains. Due consideration as to whether the breed of the pigs in this lot should also receive credit will be given in treating with the results of the duplicate experiment (1A), where all lots were of the Yorkshire breed.

Lot 4, fed linseed oil meal, shorts, barley, and skim-milk, compared favourably with lot 3 in condition at the end of the experiment, but lacked the uniformity of lot 1. The gains were practically similar to lot 3, but, on values of feeds as shown, the cost of production was increased.

Lot 5, fed peanut meal, shorts, barley, and skim-milk, were the poorest of all in condition at the end of the test. Only two of the five could be called fair bacon pigs. While this result was partially caused, no doubt, by the apparent unpalatability of the meal ration, due to the peanut meal, it must also be noted that two of the individuals showed signs of the presence of lung-worm at about the middle of the test. Nevertheless the cost per pound gain was the same as with lot 1.

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Lot 6, fed fish meal, shorts, barley, and skim-milk, made the most expensive gains of the six groups. One individual of the original five was removed after two weeks because of pulmonary trouble resulting from lung-worm infestation. The results are therefore calculated from data obtained from four individuals. Fish meal, although fed in less than one-tenth the total meal ration, caused pronounced scouring and weakness during the first two weeks, with all but one—the strongest barrow—making necessary a reduction in the quantity of meal fed. For the first three weeks, therefore, this lot was practically at a standstill. Once their system became accustomed to this feed, however, the four pigs made remarkably good gains, as shown by the later weighing periods. The poor results obtained during the first few weeks, together with the high cost of the fish meal, would explain the relatively high cost of production.

COMPARATIVE VALUES OF FEEDS.

Taking gluten feed, valued at $32 per ton, as a basis, it is possible to calculate the value of the other five feeds as compared with the former, and as shown by their power to produce gains. Such a calculation, applied as indicated, would show that with lot 1, corn was worth, per ton, $18.53; lot 3, cottonseed meal, $87.76; lot 4, linseed oil meal, $60.20; lot 5, peanut meal, $2.73; lot 6, fish meal, minus, $13.78.

SWINE-FEEDING experiment No. 1A.

Lot.		1a	2a	3a	4a	5a
Feed given.		Ground corn, shorts, ground barley and skim-milk.	Gluten feed, shorts, ground barley and skim-milk.	Cottonseed meal shorts, ground barley, and skim-milk.	Linseed oil cake, shorts, ground barley, and skim-milk.	Peanut oil meal, shorts, ground barley, and skim-milk.
Number of animals in each group	No.	5	5	5	5	5
First weight gross, (November 16, 1915)	lb.	241	188	176	180	153
First weight average	"	48·2	37·6	35·2	36	30·6
Finished weight gross, (March 21, 1916)	"	956	862	915	904	854
Finished weight average	"	191·2	172·4	183	180·8	170·8
Number of days in experiment	dys.	126	126	126	126	126
Total gain for period	lb.	715	674	739	724	701
Average gain per animal	"	143	134·8	147·8	144·8	140·2
Average daily gain for group	"	5·67	5·35	5·86	5·74	5·56
Average daily gain per animal	"	1·13	1·07	1·17	1·14	1·11
Quantity meal eaten by group for period	"	1,764	1,634	1,599	1,508	1,481
Quantity skim-milk eaten by group	"	2,992	2,987	2,962	2,956	2,924
Total cost of feed	$	30·32	28·52	26·06	26·72	24·79
Cost of feed per head	$	6·06	5·70	5·21	5·34	4·96
Cost of feed per head per day	cts.	4·8	4·5	4·1	4·2	3·9
Cost to produce 1 pound gain	"	4·2	4·2	3·5	3·7	3·5
Nutritive ratio of meal mixture		1: 6·56	1 : 4·81	1 : 4·30	1 : 4·06	1 : 4·18

Experiment No. 1a was a duplicate of feeds of Experiment No. 1 in so far as the first five lots were concerned. No fish meal, however, was fed in the duplicate experiment. Here again all lots were as uniform as possible, the pigs being from 2 to 3½ months of age. With the exception of lot 5a, the initial uniformity was in evidence throughout the period, all lots being in the best of health. Lot 5a, however, as was the case of lot 5, both fed a peanut meal ration, showed considerable difference in the quality of the individuals.

Comparisons of the standing of the lots of Experiments 1 and 1a are interesting:—

COMPARISONS of Standing in Cost of Production Experiments 1 and 1a.

Experiment.	1st.	2nd.	3rd.	4th.	5th.	6th.
	Lot.	Lot.	Lot.	Lot.	Lot.	Lot.
No. 1.....	3 (cottonseed)..	4 (linseed).....	2 (glutten).....	1 (corn).....	5 (peanut).....	6 (fish meal)
No. 1A.....	5a (cottonseed) 3a (peanut).....	4a (linseed).....	1a (corn).....	.....	.....	.....
			2a (gluten)....	.....	.....	.....

As the cost to produce will vary according to the prices paid for the foodstuffs compared, a comparison of results obtained from the standpoint of gains made in the period is worthy of notice.

COMPARISON of Standing in Total Gains, Experiments 1 and 1a.

Experiment.	1st.	2nd.	3rd.	4th.	5th.	6th.
	Lot.	Lot.	Lot.	Lot.	Lot.	Lot.
No. 1.....	3 (cottonseed)..	4 (linseed)....	2 (gluten)....	1 (corn).....	6 (fish meal).	5 (peanut)....
No. 1A.....	3a (cottonseed)...	4a (linseed). .	1a (corn).....	5a (peanut)....	2a (glu en... .	.....

The average of the results of the two experiments is as follows, together with a comparison based on averages:—

AVERAGE of Results of Experiments 1 and 1a.

Lot.		1 and 1a (corn).	2 and 2a (gluten).	3 and 3a (cotton-seed).	4 and 4a (linseed).	5 and 5a (peanut).
First weight	lb.	458	382	302·5	330	265
Finished weight	"	970·5	884	849	866·5	730
Gains for period	"	512·5	502	546·5	536·5	465
Cost of feed	$	21·73	20·63	18·10	19·02	17·40
Cost per pound gain	cts.	4·2	4·1	3·1	3·5	3·9
Average standing (costs)		5th.	3rd.	1st.	2nd.	4th.
Average standing (gains)		3rd.	4th.	1st.	2nd.	5th.

OTTAWA.

COMPARATIVE VALUES OF FEEDS ON A COMMERCIAL BASIS.

From a gain-producing standpoint and compared with gluten meal at $32 per ton, the other four feeds compared in Experiment 1a may be shown to have the following valuations: Lot 1, corn $29.48 per ton; lot 3, cottonseed meal, $58.19; lot 4, linseed meal, $57.89; lot 5, peanut meal, $69.30.

DATA FROM EXPERIMENT.

Where fed in quantities governed by their varying protein content, it would appear from these experiments that:—

(1) Cottonseed meal is capable of producing low-cost gains; that it is a safe, palatable feed when used in the proportions indicated.

(2) Linseed oil meal may be regarded as practically the equal of cottonseed meal, the two lots having stood first and second in both experiments both in cost to produce and gains made, with only a slight difference in results.

(3) Peanut meal, while it stands low in the comparative gains made, shows up well in the cost of production, due to the relatively small quantity necessary when fed on a protein basis. The lot fed peanut meal made a much better showing in the duplicate experiment, due to the fact that the pigs were not subject to the untoward influences affecting the individuals of the first experiment. While they equalled the cottonseed fed pigs in cost of production in Experiment 1a, they nevertheless evidenced lack of uniformity in condition and relish of their meal ration.

(4) Gluten meal and corn meal fed in equal quantities in the ration gave results showing little difference, the slight superiority being in favour of the corn fed pigs. The latter, however, were better and more uniformly finished.

(5) Fish meal, as fed in experiment 1, proved palatable, but even fed as one-tenth of the meal ration cause intestinal disturbances sufficient seriously to affect economy of production with this lot.

COST OF REARING BREEDING SOWS TO 13 MONTHS OF AGE.

In order to obtain information on the actual cost of rearing a sow from birth to first farrowing, figures were obtained from records of several litters from birth to three months of age, from eighteen pigs from three to six months, and from five sows from their sixth to the end of their thirteenth month.

From the foregoing sources the following average cost was determined, representing the feed cost for a sow farrowed on April 1, until April 30 of the following year, thirteen months in all:—

Feed cost of young sow from birth to six months, not including any charge for dam previous to farrowing:—

6	pounds	oil meal.	
88	"	shorts.	
88	"	oats.	
70	"	barley.	
252	pounds	meal at $26.80 per ton	$3 38
500	"	skim-milk at 20 cents per cwt	1 00
Pasture estimated at			50
			$4 88

Feed cost from six months to thirteen months of age:—

489	pounds	bran at $21 per ton	$5 13
306	"	shorts at $23 per ton	3 52
600	"	roots at $2 per ton	60
100	"	clover hay at $7 per ton	35
			9 60
Total cost of feed			$14 48

Ottawa.

FINANCIAL STATEMENT FOR SWINE.

Below are submitted inventories and returns for swine on the Central Experimental Farm for the year April 1, 1915, to March 31, 1916.

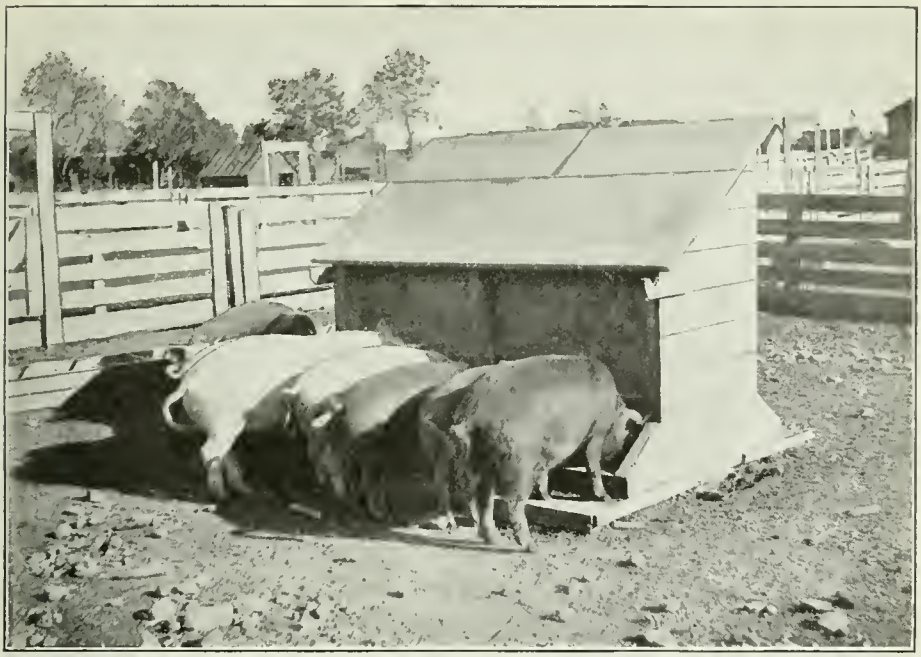
	April 1, 1915.		March 31, 1916.		Returns, including Sales.	Gross returns, including Sales and increased Values.
	No.	Value.	No.	Value.		
		$		$	$	$
Swine, all breeds and ages....	220	4,854 00	171	5,544 00	2,952 06	3,642 06

RETURNS.

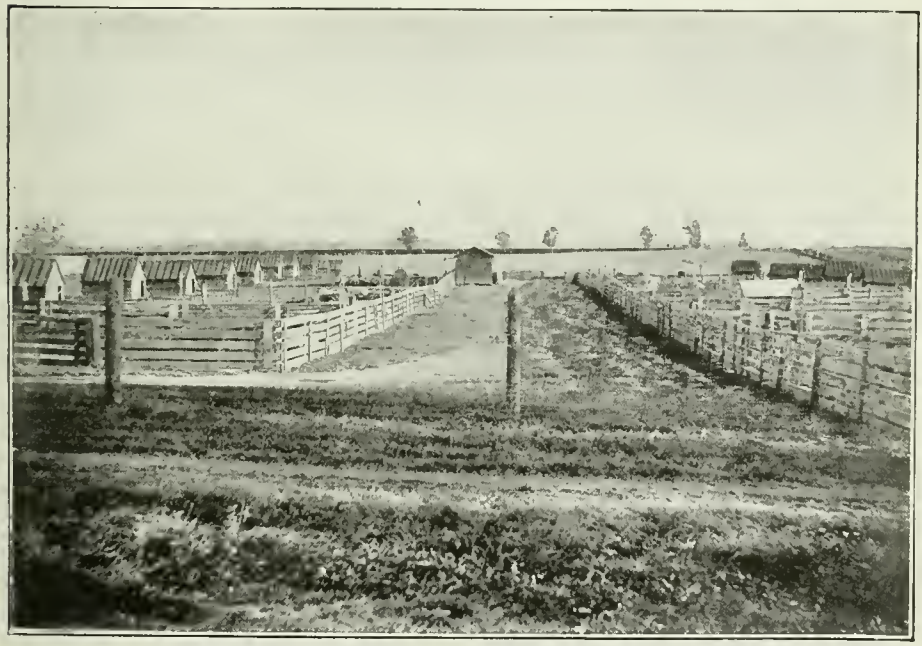
By Increased value	$ 690 00	
Sales of breeding stock	1,695 50	
Sales of feeding stock	969 56	
Boar service fees	37 00	
Manure, 250 tons at $1	250 00	
Gross returns		$3,642 06

EXPENDITURES

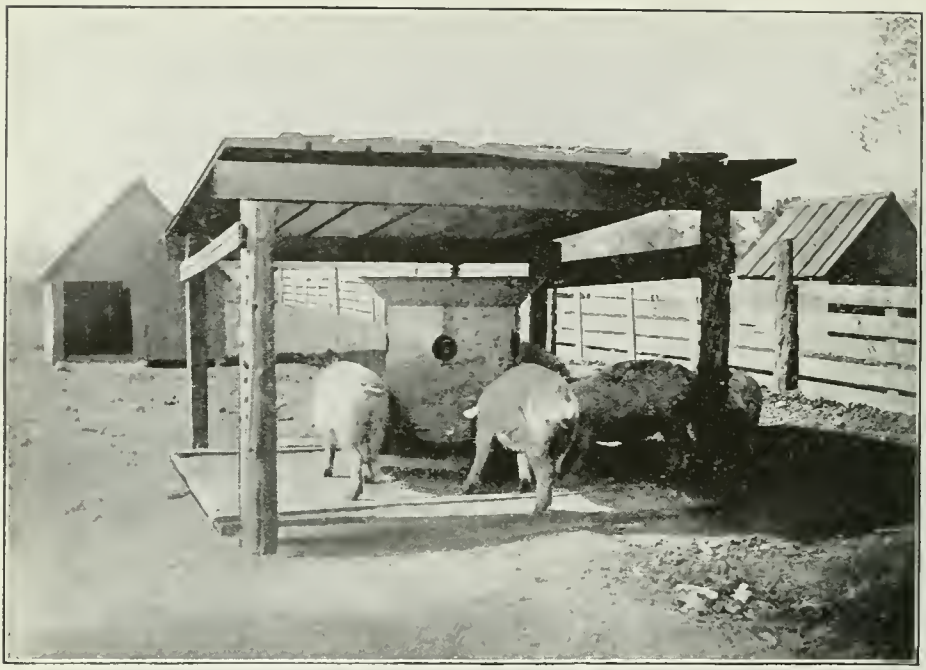
To Foods consumed	$1,592 30	
Purchase of breeders	150 00	
Labour expended	1,571 00	
Gross expenditures		3,313 30
Net balance from swine		$ 328 76



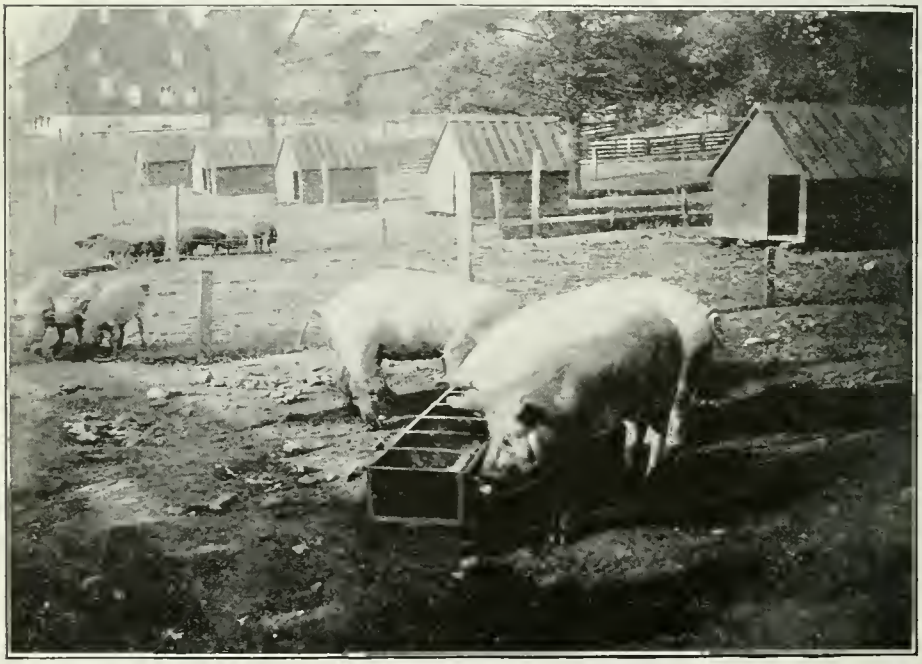
The self-feeder for swine. Central Experimental Farm, Ottawa.



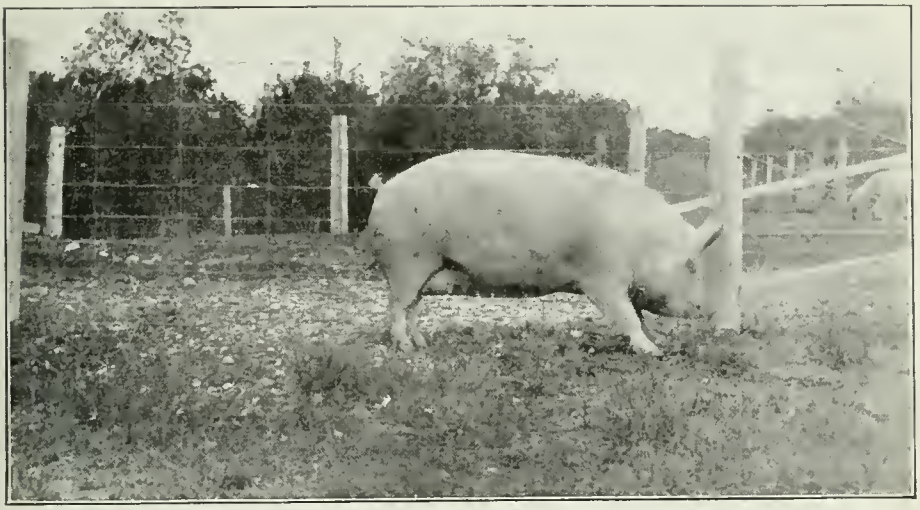
Summer Paddock for swine. Central Experimental Farm, Ottawa.



The feed grinder for swine. Central Experimental Farm, Ottawa.

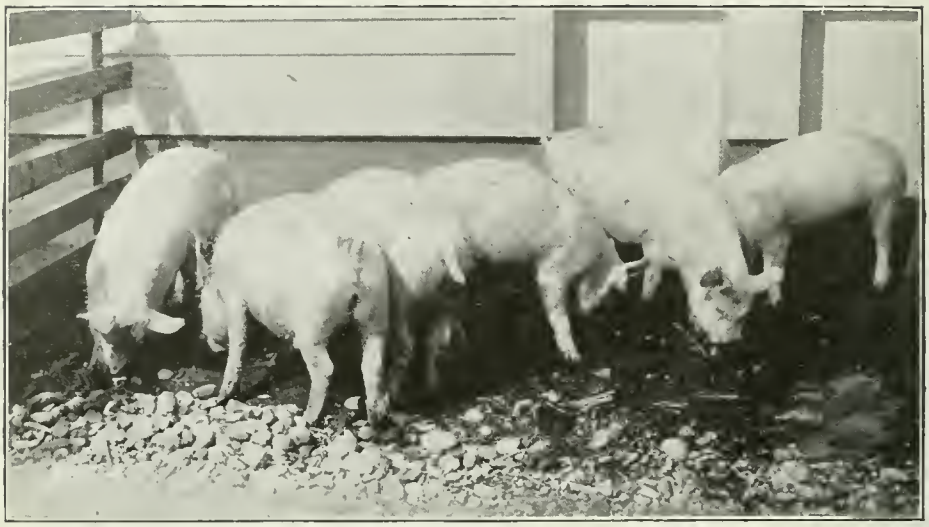


Trough feeding of swine. Central Experimental Farm, Ottawa.



Brandon : Yorkshire sow, Brandon Augustine.

Agassiz, B. C. Winter sleeping accommodations for brood sows.



Agassiz, B.C. Pen 88. Fed for 81 days on a ration of rice shorts, mangels, skim milk, ground rock phosphate.

Agassiz, B.C. Pen 87. Fed for 81 days on a ration of rice shorts, mangels and skim milk.

EXPERIMENTAL FARM, NAPPAN, N.S.

REPORT OF THE SUPERINTENDENT, W. W. BAIRD, B.S.A.

BREEDING SWINE.

Only two breeds are kept at this Farm, namely, Berkshires and Yorkshires. The total number at the end of March, 1916, was eighteen. Of Berkshires there are two aged sows, three young sows and two boars. Of Yorkshires there are three aged sows, one young sow and a boar.

Only fair returns have been obtained from the breeding sows this spring, the principal cause being that they were in a little too high condition, consequently the litters were not as large in number or as strong as they were a year ago from the same sows, when they were in just good condition, that is, not too fat.

During the season there were five boars and three sows sold for breeding. The demand for such was very light.

The remaining stock of young pigs, of which there were twenty-nine, together with some aged sows, which had fulfilled their usefulness, were fattened and sold as pork. The price of pork has been good throughout the entire season ranging from 10 to 14 cents per pound; consequently, a greater demand for breeders during the winter of 1915-16, but the call for breeders has not changed as much as would have been expected. In the course of the next season some feeding experiments will be started with a view of obtaining some data on the cost of production.

EXPERIMENTAL STATION, STE. ANNE DE LA POCATIERE, QUE.

REPORT OF THE SUPERINTENDENT, JOS. BEGIN.

SWINE.

Our herd of swine now includes a good Yorkshire boar, three sows 2 and 3 years old, and two yearling sows of the same breed; all are of good bacon type. Two young boars and two young sows were sold for breeding purposes to agricultural societies.

It is impossible, as yet, with our present facilities, to undertake feeding experiments on a permanent scale; however, some experiments bearing on the feeding of sows in winter were carried on. Three sows were kept in cabins 6 by 8 feet, made with a single ply of boards. They wintered very well in the cabins and the litter remained dry and clean throughout the winter. At first, one might be led to think that this method requires a great quantity of litter in order to keep a dry and healthy bedding; but, everything considered, it does not cost more to keep the bedding in good condition in these cabins than for the same number of animals kept in confinement.

The main ration for these sows consisted of a mixture of wheat bran, 100 pounds; ground oats, 100 pounds; middlings, 100 pounds. Some 3 or 4 pounds of this mixture, with 6 to 8 pounds of roots sliced with a root cutter, were distributed in the morning at some distance from the cabin, in order to compel the sows to take a certain amount of exercise. About two hours after this first meal, a warm drink with a little skim-milk, or when no skim-milk was available, with a handful of oat meal, was given. Good clover hay was kept every day in a covered rack and the sows could eat as much of it as they liked during the day. For the evening meal, 2 to 4 pounds of grain steeped in warm water were given per head. The following observations were made: Of three kinds of roots (swedes, beets, and carrots), the carrots are liked better than the beets and the beets better than the swedes. It has also been observed that roots cut beforehand and given cold, mixed with grain, are not very well liked. From 2 to 4 pounds of clover were consumed on an average per day by each of the sows, during the first few months of the winter.

Not having the necessary equipment to make comparative feeding experiments, we have fattened eighteen young pigs which were born too late in the season to be sold for breeding purposes. The herd was divided into three lots of six each and placed in a building used temporarily for sheltering pigs. The weight of the eighteen young pigs was recorded just at the time when they were submitted to intensive feeding. Ten of these pigs were 15 weeks old and the other eight 17 weeks old. The feeding lasted eighty-two days. The amount and price of the grain consumed at the current market price are given herewith:—

Ground corn—1,580 pounds at $39 per ton	$30 81
" barley—1,540 pounds at $35 per ton	26 95
" oats—1,650 pounds at $33 per ton	27 22
Small potatoes—42 bushels at 25 cents per bushel	10 50
Skim-milk—6,500 pounds at 20 cents per 100 pounds	13 00
Total cost of feed	$108 48
Finished weight—3,600 pounds at 8½ cents per pound live weight	$306 00
Initial weight—1,476 pounds at 8½ cents per pound	125 46
Gain in weight—2,124 pounds at 8½ cents per pound	180 54
Average gain per head during experiment ..lb.	118
Cost of 1 pound of pork ..cents.	5·1
Net profit per pound "	3·39

EXPERIMENTAL FARM, BRANDON, MAN.

REPORT OF THE SUPERINTENDENT, W. C. McKILLICAN, B.S.A.

SWINE.

There are forty-six swine on this Farm on March 31, 1916. They consist of the following: Berkshire—2 boars, 7 sows, 7 young pigs. Yorkshire—2 boars, 4 sows, 18 young pigs. Crossbred—6 feeders.

The best of the surplus pure-bred offspring are sold to farmers for breeding purposes. They are usually sold at weaning time, and at that age can be sold for very reasonable prices.

COST OF FEEDING SOWS.

Records have been kept of the feed used for each pig on the Farm in order to obtain data on the cost of production. A mature sow in one year consumed the following quantities of feed, including feed for little pigs up to weaning time:—

Feed Used by Mature Sow in One Year.

668	pounds	barley at 40 cents per bushel	$ 5 57
49	"	oats at 34 cents per bushel	49
383	"	shorts at $18 per ton	3 45
86	"	feed flour at $25 per ton	1 07
122	"	bran at $16 per ton	98
560	"	skim-milk at 20 cents per cwt	1 12
245	"	mangels at $3 per ton	37
		Total cost	$13 05

A young sow born March 5, 1915, consumed the following quantities of feed from weaning time at 7 weeks of age to 1 year of age:—

Feed Used by Young Sow from Weaning to One Year.

450	pounds	barley at 40 cents per bushel	$3 75
241	"	shorts at $18 per ton	2 17
37	"	feed flour at $25 per ton	46
41	"	bran at $16 per ton	33
159	"	skim-milk at 20 cents per cwt	32
350	"	mangels at $3 per ton	52
Pasture estimated at			50
		Total	$8 05

The dam of this sow raised ten pigs in the year, but counting eight pigs as an average crop from a sow in a year, the cost of the sow's feed per pig would be $1.63, this, added to the $8.05 cost of feed after weaning, would bring the total cost of feed for the production of a year old sow up to $9.68.

SWINE FEEDING EXPERIMENTS.

FEEDS TO MIX WITH BARLEY.

In this province barley is generally accepted as the standard food for pig fattening, but differences of opinion exist as to the desirability of mixing other foods with it and as to what are the best feeds to use. An experiment was conducted in 1914-15 to obtain information along this line, and it has been repeated this year. Barley formed the main feed throughout, but different mixtures were fed to the different lots.

All received a small ration of digester tankage along with the other feeds. Four lots of pigs were used. They were home-raised pigs of pure Yorkshire and Berkshire-Yorkshire cross breeding. The rations fed, exclusive of the tankage, were as follows:—

Lot 1.—Barley pure.
Lot 2.—Barley 3 parts, feed flour 1 part.
Lot 3.—Barley 3 parts, shorts 1 part.
Lot 4.—Barley 2 parts, oats 2 parts.

The feeds were all purchased, and the prices shown in the table are those actually paid. During most of the time, the pigs got from 5 to 6 pounds of these feeds per pig per day according to appetite and each pig got about ⅔ pound of tankage daily.

The following tables show, first, the gains made by each pig during month of the experiment, and secondly, a summary of the whole experiment showing results in gains, cost of production, etc.

MONTHLY GAINS IN WEIGHTS.

LOT 1.—Fed Barley Chop.

Pig.	Weight Dec. 9.	Weight Jan. 6.	Weight Feb. 3.	Weight Feb. 28.	Gain in 81 days.
No. 1	130	165	205	230	100
No. 2	90	120	150	175	85
No. 3	93	125	160	180	87
No. 4	140	160	190	205	65
No. 5	92	140	181	205	113
Average	109	142	177	199	90

LOT 2.—Fed Barley Chop and Feed Flour.

Pig.	Weight Dec. 9.	Weight. Jan. 6.	Weight. Feb. 3.	Weight Feb. 28.	Gain in 81 days.
No. 1	97	130	161	185	88
No. 2	117	160	185	195	78
No. 3	113	160	190	215	102
No. 4	102	140	165	205	103
No. 5	111	135	170	175	64
Average	108	145	174	195	87

LOT 3.—Fed Barley Chop and Shorts.

Pig.	Weight Dec. 9.	Weight Jan. 6.	Weight Feb. 3.	Weight Feb. 28.	Gain in 81 days.
No. 1	107	135	165	185	78
No. 2	122	160	190	210	88
No. 3	106	130	155	175	69
No. 4	130	165	200	215	85
Average	116	147	177	196	80

Lot 4.—Fed Barley Chop and Oat Chop.

Pig.	Weight Dec. 9.	Weight Jan. 6.	Weight Feb. 3.	Weight Feb. 28.	Gain in 81 days.
No. 1	127	165	198	215	88
No. 2	107	135	160	180	73
No. 3	123	135	185	195	72
No. 4	113	155	160	160	47
Average	117	147	176	187	70

Summary of Pig Feeding Experiment.

		Lot 1. Barley Chop.	Lot 2. Barley Chop and Feed Flour. 3 to 1.	Lot 3. Barley Chop and Shorts. 3 to 1.	Lot 4. Barley Chop and Oat Chop 1 to 1.
Number of pigs in lot		5	5	4	4
First weight gross Dec. 9, 1915	lb.	545	540	465	470
First weight average	"	109	108	116·2	117·5
Finished weight gross Feb. 28, 1916	"	995	975	785	750
Finished weight average	"	199	195	196·2	187·5
Total gain in eighty-one days	"	450	435	320	280
Average gain per pig	"	90	87	80	70
Average daily gain per pig	"	1·11	1·07	·99	·86
Amounts of feed Used—					
Barley chop at 40 cents per bushel	"	1,980	1,485	1,188	792
Shorts at $18 per ton	"	.....	.....	396	.....
Feed flour at $25 per ton	"	.....	495	.....	.....
Oats at 34 cents per bushel	"	.....	.....	.....	792
Tankage at $43 per ton	"	162	162	130	130
Total cost of feed	$	19·98	22·04	16·26	17·32
Cost of 100 lbs. gain	$	4·44	5·07	5·08	6·18

These results concur with last year's in that they show the value of barley as a pig fattening food and in that the mixture containing oats was the most expensive and least satisfactory. Last year, barley and feed flour gave best results, and this year, barley alone has done best. In both years, feed flour has excelled shorts both in gains and cheapness of production, though the advantage in the latter is small.

SUCCULENT FEED FOR YOUNG PIGS.

Two experiments were conducted this year in regard to the use of succulent feeds for growing pigs. Skim-milk is not usually available for such pigs on this Farm, and the same is true of most Manitoba farms. The need of some succulent feed to substitute, at least partly, for skim-milk is felt. An experiment was started on September 14, 1915, using mangels and potatoes; the potatoes were the unmarketable small ones out of the season's crop. Both mangels and potatoes were fed in raw and cooked form. The raw feeds were charged at $3 per ton, and $2 additional was charged for cooking. All the pigs used got a grain ration of 2 parts of barley to 1 part of shorts with a small portion of tankage added. The grain ration most of the time was 1½ pounds per pig daily, and the mangel or potato ration was started at 7 pounds per pig daily and increased to 7½ pounds.

BRANDON.

The pigs used were home-raised, Yorkshires and Yorkshire-Berkshire crosses. They were divided as equally as possible into four lots each. The pigs were not in a thrifty condition and none did very well. The results are summarized in the following table:—

PIG-FEEDING Experiments.

		Lot 1. Barley chop, Shorts, Cooked Potatoes.	Lot 2. Barley chop, Shorts, Raw Potatoes.	Lot 3. Barley chop, Shorts, Cooked Mangels.	Lot 4. Barley chop, Shorts, Raw Mangels.
Number of pigs in lot		4	4	4	4
First weight gross, Sept. 14, 1915	lb.	215	224	213	211
First weight average	"	53·7	56	53·2	52·7
Weight gross, Nov. 4, 1915	"	361	330	348	323
Weight average, Nov. 4, 1915	"	90·2	82·5	87·	80·7
Total gain in 50 days	"	146	106	135	112
Average gain per pig	"	36·5	26·5	33·7	28
Average daily gain per pig	"	·73	·53	·67	·56
Amounts of feed used—					
Barley chop at 40 cents per bushel	lb.	254	254	254	254
Shorts at $18 per ton	"	142	142	142	142
Tankage at $43 per ton	"	66	66	66	66
Cooked potatoes at $5 per ton	"	1,484			
Raw potatoes at $3 per ton	"		1,484		
Cooked mangels at $5 per ton	"			1,484	
Raw mangels at $3 per ton	"				1,484
Total cost of feed	$	8·52	7·04	8·52	7·04
Average cost of 100 pounds gain	"	5·84	6·64	6·31	6·29

The cooked potatoes gave the best results both in gains and cost of production. The raw potatoes were least satisfactory of any, so that it may safely be concluded that where potatoes are to be fed to pigs it will pay to cook them, unless the cost or inconvenience of cooking is too great an obstacle. The cooked mangels gave greater gains than did the raw ones, but not quite enough greater to pay for cooking at $2 per ton.

Another experiment of similar nature was conducted almost at the same time. In this experiment the comparison of raw *versus* cooked mangels was repeated, and rations in which these succulent feeds formed a large part were tested against a straight grain ration. Lots 1 and 3 received 1 pound of barley, half a pound of shorts and 7½ pounds of mangels per pig per day. Lot 2 received double this quantity of grain and no mangels. All got about two-fifths of a pound of digester tankage per day.

These pigs were Berkshire-Yorkshire crosses and all except one were in thrifty, vigorous condition and did well. One pig in lot 1 gained only 25 pounds during the test, and probably the poor showing of that lot is partly due to his unthriftiness.

The results obtained are as follows:—

BRANDON.

PIG-FEEDING Experiments.

		Lot 1. Cooked mangels, Barley chop, Shorts.	Lot 2. Barley chop, Shorts.	Lot 3. Raw mangels, Barley Chop, Shorts.
Number of pigs in lot		4	4	4
First weight gross, October 14, 1915	lb.	185	190	195
First weight average	"	46·2	47·5	48·7
Weight gross, December 9, 1915	"	383	409	422
Weight average, December 9, 1915	"	95·7	102·2	105·5
Total gain in 56 days	"	198	219	227
Average gain per pig	"	49·5	54·7	56·7
Average daily gain per pig	"	·88	·98	1·01
Amounts of feed used—				
Barley chop at 40 cents per bushel	"	240·8	464·8	240·8
Shorts at $18 per ton	"	120·4	232·4	120·4
Tankage at $43 per ton	"	80	80	80
Cooked mangels at $5 per ton	"	1,680	.....	.....
Raw mangels at $3 per ton	"	.....	.....	1,680
Total cost of feed	$	9·01	7·68	7·33
Average cost of 100 pounds gain	$	4·55	3·51	3·23

The results here obtained would indicate that pigs of this size (40 to 50 pounds) can use raw mangels to good advantage, making good daily gains at low cost. However, a well balanced grain ration has also given results nearly as good as those from the ration including mangels. The only satisfactory conclusion is that either may be used successfully depending on comparative cost. The cooked mangels show up badly in this test, and is probably partly explained by the presence of one unthrifty pig; however, even had the gains of this lot been equal to the others, the cost of production would still be distinctly greater.

EXPERIMENTAL FARM, INDIAN HEAD, SASK.

REPORT OF THE SUPERINTENDENT, W. H. GIBSON, B.S.A.

SWINE.

The breeding herd at Indian Head Experimental Farm on March 31, 1916, consists of the following:—

Yorkshires.—Two stock boars, one young boar, three brood sows and five young sows.

Berkshires.—One stock boar, one young boar, three brood sows and two young sows.

Grades.—Fifteen feeders and two litters of seven each.

During the fall of 1915 a new piggery was erected, which provides ample accommodation for more extended work in this important branch of animal husbandry.

All the brood sows were wintered in outside cabins, and the cost of wintering is presented herewith.

Cost of wintering six brood sows from December 1, 1915 to March 31, 1916:—

1,182	pounds straw for bedding at $2 per ton	$ 1 18
1,356	" oatchop at $30 per ton	20 34
1,356	" barley chop at $30 per ton	20 34
	Total cost	$41 86
	Average cost	$ 6·98
	Average cost per sow per day	cents. 5·7

EXPERIMENTAL STATION, LACOMBE, ALTA.

REPORT OF THE SUPERINTENDENT, G. H. HUTTON, B.S.A.

SWINE.

On March 31 the hogs at this Station numbered 60, made up as follows: 1 Yorkshire boar, 9 Yorkshire sows, 3 Berkshire boars, 19 Berkshire sows, 3 young Berkshire sows, 25 barrows and young pigs.

A piggery has been erected during the year with accommodation for ten sows at farrowing time and equipped with a feed room, weigh scales, feed cooker and water supply, with storage overhead for grain and bedding. The erection of this building will make possible the comparison of the cost of producing pork both winter and summer under favourable conditions (as far as expensive housing will provide such conditions) with the housing of hogs in cabins, straw covered, but otherwise in the open. The accommodation per pen in the new piggery will cost about $200, while the accommodation per cabin even with the advance in the cost of lumber which recently went into effect, will be about $13. It will be extremely interesting to compare the cost of pork production under the two systems of housing.

RATIONS FOR HOGS AFTER WEANING.

Three groups of five hogs each were fed on different rations after being weaned at about the age of ten weeks. The cost of producing a pound of gain on these young pigs when fed wheat and water was $3.21 per 100 pounds, while the cost of producing 100 pounds of gain with shorts and water was $4.71 and the cost when fed shorts and skim-milk, $3.71. Whether these figures will be corroborated in further trials is questionable through the relation between the cost of gain of groups fed on wheat and water and shorts and skim-milk. However, wheat as a ration for hogs has been showing up remarkably well here for some time and two pounds of wheat in another experiment carried on during the past season produced as much gain as three pounds of oats and barley mixed.

The following table gives the results of this test:—

TABLE Showing Gains for First 30 Days After Weaning.

	Lbs. Fed.	Shorts, Milk.	Lbs. Fed.	Shorts, Water.	Lbs. Fed.	Wheat, Water.
No. of hogs in test		5		5		5
Weight at June 28, at weaning		218		203		200
Weight at July 28		336		266		256
Total gain		118		63		56
Average daily gain		·786		·42		·373
Cost of shorts at $1.65 per 100	195	$3 21	180	$2 97		
Cost of wheat at 1 cent per pound					180	$1 80
Cost of milk at 20 cents per 100	585	1 17				
Total cost of feed		4 38		2 97		1 80
Cost per 100 pounds gain		3 71		4 71		3 21

NOTE.—Pasture for all groups was wheat, oats and barley.

DAILY GAIN IN WEIGHT OF HOGS FOR 30-DAY PERIODS AFTER WEANING.

The table submitted herewith is interesting in that it shows the average daily gain of ten groups of hogs for 30-day periods after being weaned. These hogs were fed a variety of rations and included all the hogs being used in experimental feeding work during the past season so that the figures given are for all the pigs under test last year and should represent average conditions. Grain was fed on the 3 per cent basis.

TABLE Showing Average Daily Gains of Hogs for a Period of from One to Four Months After Weaning. Figures are the Average of 10 Lots of 5 Hogs Each on Various Feeds.

	Pounds.
Daily gain for first 30-day period	0·570
" second 30-day period	0·8118
" third 30-day period	0·8718
" fourth 30-day period	1·704

VALUE OF PASTURE IN REDUCING COST OF PORK PRODUCTION.

The prices received for hogs during the fall and winter of 1914-15 were low and resulted in many farmers reaching the decision that they would discontinue the production of this class of live stock. Since the prices received were considered by many men to be below the cost of production and since further information as to the actual cost was sought, extensive experiments were begun in 1915 with the object of comparing the cost of producing pork with hogs on pasture *versus* dry feed lot. It was also included in the objects of this experiment to determine the best pastures available in this climate. The test was made with wheat, oats and barley mixed, the grain being used in equal proportions by weight. Alfalfa, rape, oats, barley and wheat alone were also used and the following table outlines the results of this test and provides a striking testimony as to the value of pasture and as to the extent by which the cost of producing 100 pounds of pork may be reduced by the use of pasture. The stock-carrying capacity of land in pasture has not been fully determined but it is believed that 1 acre in a good pasture such as alfalfa, rape, or wheat, oats and barley mixed will carry from ten to fifteen hogs during the growing season. If further tests confirm this opinion, an acre of land in hog pasture will return as large a net profit as land used in the production of any other crop.

TABLE Showing Gains Made by Hogs on Different Pastures.

Lot number.	1	5	7.	8	9.	10.	14.
No. of hogs in test	No. 5	5	5	5	5	5	5
Kind of pasture	Wheat, Oats and Barley.	Alfalfa.	Rape.	Oats.	Barley.	Wheat.	Corral.
Weight at June 28 at weaning	lb 218	217	207	202	217	211	224
Weight at Sept. 27	" 586	585	561	564	564	512	452
Total gain	" 368	368	354	362	347	301	228
Average daily gain	" 808	·808	·778	·795	·762	·661	·501
Amount of shorts fed first 30 days	" 195	195	187·5	180	195	187·5	202·5
Cost shorts at $1.65 per 100	$ 3 21	3 21	3 09	2 97	3 21	3 09	3 34
Amount of wheat fed	lb 850	814	799·5	832·5	780	784·5	752·5
Cost of wheat at 1 cent per pound	$ 8 50	8·14	7·99	8·32	7·80	7 84	7 52
Amount milk fed (first 30 days)	lb 585	585	570	540	585	570	615
Cost of milk at 20 cents per per 100 pounds	$ 1 17	1 17	1 14	1 08	1 17	1 14	1 23
Total cost of feed	$12 88	12 52	12 22	12 37	12 18	12 07	12 09
Cost per 100 pounds gain	$ 3 50	3 40	3 45	3 41	3 51	4 00	5 30
Profit on lot at 8 cents per pound	$34 00	34 28	32 66	32 75	32 94	28 89	24 07

Four groups of hogs were run on wheat, oats and barley during the entire season and were fed a variety of grain rations. Group 1 received shorts and wheat throughout the entire feeding period and skim-milk for the first thirty days after weaning. Group 2 received shorts and wheat throughout the entire feeding period and skim-milk with the exception of the first thirty days after weaning. Group 3 received a grain ration of well ground oats and barley in equal parts mixed with water. Group 4 was fed ground wheat mixed with water. The grain was fed in the proportion of three pounds of grain to 100 pounds live weight of hogs and was increased every two weeks on the basis of the gains made by the hogs. The figures showing the average daily gain of groups 1 and 2 for the first thirty days after weaning show the value of skim-milk as a part of the ration for this period. However, the gains made by group 4 for the first thirty day period are creditable and the gains for the whole period again emphasize the value of wheat as a ration for hogs.

	Lb. Fed.	Lot No. 1 Shorts, Milk 1st 30 days, wheat and water for remaining period.	Lb. Fed.	Lot No. 2 Shorts, Water 1st 30 days, wheat and milk for remaining period.	Lb. Fed.	Lot No. 3 Barley and oats for entire period.	Lb. Fed.	Lot No. 4 Wheat and water for entire period.
Number of hogs in test		5		5		5		5
Pasture, wheat, oats and barley mixture								
Weight at June 28, at weaning		218 lb.		203 lb.		200 lb.		200 lb.
Weight at June 27		810 "		1,035 "		688 "		729 "
Total gain		592 "		832 "		488 "		529 "
Average daily gain for 1st 30 days		·786 "		·42 "		·5 "		·374 "
Average daily gain for 2nd 30 days		·860 "		1·326 "		·730 "		·730 "
Average daily gain for 3rd 30 days		·806 "		1·455 "		·646 "		·860 "
Average daily gain for 4th 30 days		1·49 "		2·62 "		1·53 "		1·56 "
Average daily gain		·978 "		1·375 "		·806 "		·874 "
Cost of shorts fed at $1.65 per 100	195	$3 21	180	$2 97			1,464·5	$14 64
Cost of wheat fed at 1 cent per pound	1,784	17 84	1,771·5	17 71				
Cost of milk fed at 20 cents per 100 pounds	585	1 17	2,835	5·67				
Cost of oats and barley fed at 1 cent per pound					1,651·5	$16 51		
Total cost feed		22 22		26 35		16 51		14 64
Cost per 100 pounds gain		3 75		3 16		3 38		2 76
Profit on lot at 8 cents per pound		42 58		56 45		38 53		43 68

COST OF KEEPING SIX SOWS FOR ONE YEAR.

Four Berkshire and two Yorkshire sows have been carried for the full year and the cost of feed for the period has been as follows:—

Four months on pasture at 50 cents per sow per month	$ 12 00
Twelve months on grain, total consumed 10,266 pounds at 1 cent per pound	102 66
102·5 pounds of skim-milk per sow at 20 cents per 100 pounds	12 30
Total cost	$126 96
Average cost per sow	$21 16

Cost of raising ten young Berkshire Sows from farrowing until approximately one year old.

Four months on pasture at 50 cents per sow per month	$ 20 00
Ten months on grain, total consumed 15,430 pounds at 1 cent per pound	154 30
23,650 pounds of skim-milk at 20 cents per 100 pounds	47 30
Total cost	$221 60
Average cost per gilt	$22 16

EXPERIMENTAL FARM, AGASSIZ, B.C.

REPORT OF THE SUPERINTENDENT, P. H. MOORE, B.S.A.

BREEDING WORK WITH SWINE.

The herd of swine in 1915-16 consisted entirely of pure bred Yorkshires. In all there were four boars, fit for service, and twenty-one producing sows, at one time or another during the year. Three boars and seven producing sows were sold, killed, or exchanged during the year, and when necessary have been or are being replaced by younger and better stock. Stock at the close of the year, March 31, consisted of: three boars, twenty brood sows, forty-four sucking pigs, and seventy-eight experimental feeders.

In methods of feeding and handling, economy or low cost of keep and shelter commensurate with good results was given first consideration. Equipment for breeding stock is such that no farmer who wished to raise pigs could not easily have similar nor in fact could he get along with much less.

The breeding stock and young growing pigs are sheltered in "A" shaped, single boarded, battened cots with single boarded floors 6 by 8 feet, the cot being 6 feet 3 inches to apex. Each cot has an opening large enough to admit sow, has no door, and is provided as well with a ventilation hole at the back near apex. The cots are built on skids, are portable, and with a liberal amount of bedding the pigs were comfortable in what proved to be a very severe winter in this district. The cots are placed on the front of a piece of uncleared land, and under the protection, from our coldest winds, of a large hill.

A few days before farrowing time the sow to farrow is brought into a cheaply constructed building in the neighbourhood of the cots where she is kept and tended until about two weeks after farrowing. She is then placed in a run with no shelter but the "A" shaped cots and a little shade. The sow is gradually worked up in her feed, at two feeds a day, to full feed till when the pigs are 3 to 4 weeks of age she is getting all the grain, in addition to pasture, roots, or green feed, that she will consume. As soon as the young pigs will drink skim-milk or eat grain, skim-milk and dry crushed grain is kept constantly before them in a creep. The pigs are weaned at 10 weeks and when the sow is dried off she is given a little extra care till she is in shape to get her share at the trough with the sows on range. She is then turned out on a piece of rough bush land and given about a pound of grain per day per 100 pounds live weight, varying with the conditions of range. During the winter the pasture is replaced by roots or silage. When she has regained condition she is bred at such time so that weather conditions at farrowing time may be favourable. Plenty of exercise and fair condition improving towards farrowing time is the general principle followed for these periods of the brood sow's life.

Below is given the life record of performance of the individual brood sows who were in the herd in any part of 1915.

LIFE Record of Producing Sows, in herd from April 1, 1915, to March 31, 1916, or any part thereof.

Sow No.	Age.	Total No. of litters.	Total No. of		Average No. of		Per cent of pigs farrowed raised.
			Pigs farrowed.	Pigs raised.	Pigs per litter. farrowed.	Pigs per litter. raised.	
*19	3½	4	49	31	12·2	10·3	88·5
13	4	4	55	38	13·7	9·5	69·9
24	1¾	1	11	9	11·	9·	81·81
16	1½	1	10	9	10	9·	90·
9	2¼	3	32	26	10·6	8·6	81·25
6	2¾	3	31	26	10·3	8·6	83·87
5	2½	2	25	17	12·5	8·5	68·
31	2½	2	21	17	10·5	8·5	80·95
17	3½	5	50	41	10·	8·2	82·
25	1¾	1	11	8	11	8·	72·72
7	2¾	3	30	24	10	8·	80·
18	2½	2	19	16	9·5	8·	84·21
23	2¼	2	19	16	9·5	8·	84·21
11	4¼	6	56	46	9·3	7·6	82·14
3	6½	8	93	60	11·6	7·5	64·51
32	2½	2	18	14	9·	7·	77·77
**10	4¼	6	67	34	11·1	6·8	50·74
12	4	4	35	25	8·7	6·2	71·42
15	2	1	7	4	7·	4·	57·14

*One litter of 14 pigs aborted. Averages based on remaining 3 litters.
**One litter met with accident. Averages based on 5 litters.

The average numbers of pigs farrowed was 10·6, while the average number raised was 7·6, or a per cent of 72·14 of pigs farrowed raised.

The record of the sows for 1915 is as follows:—

RECORD of Producing Sows for 1915, in order of merit on life record.

Sow No.	No. of pigs farrowed.	No. of pigs raised.	Per cent of pigs farrowed and raised.
19	13	10	76·92
13	27	20	74·08
24	11	9	81·81
16	10	9	90·
9	11	9	81·81
6	24	19	79·16
5	11	10	90·90
31	11	10	90·90
17	28	21	75·
25	11	8	72·72
7	23	16	69·65
18	10	10	100·
23	9	7	77·77
11	11	10	90·90
3	12	7	58·33
32	17	14	82·35
10	11	10	90·90
12	7	5	71·42
15	7	4	57·14

A total of twenty-four litters gave 264 pigs farrowed and 208 pigs raised, which gives an average of eleven pigs farrowed per litter and 8·75 raised.

Some sows were let off with one litter during the year as a sufficient supply of pigs were on hand for experimental purposes and owing to previous hard work many of the sows needed a rest.

The feed cost per year of an average brood sow raising two litters a year is given below. This includes the feed of her young pigs to weaning age and is based on four sows whose average in pigs per litter closely approximates the herd average 10·6 pigs farrowed and 8·6 pigs raised per litter. These sows average in breeding condition 400 pounds in weight.

1825	pounds	shorts	at $24·00	$21 90
104	"	crushed oats	24·00	1 25
104	"	crushed barley	24·00	1 25
101	"	rice meal	24·00	1 21
34	"	bran	22·00	0 37
14	"	corn meal	36·00	0 25
1500	"	skim-milk	5·00	3 74
950	"	roots	0·15	1 42
120	"	potatoes (frozen)	2·00	0 12
				31 51

The young pigs are used as experimental feeders, kept in the breeding herd, or sold as breeding stock. The best individuals are selected for breeding purposes and this, in combination with the life record kept of each producing sow, gives us an excellent opportunity of improving our herd.

The cost of raising a sow to 1 year, or breeding age, is figured on an average litter of nine pigs to 6 months of age and from 6 to 12 months on an average of ten young sows which were raised for breeding work, selected from a number of litters. That the figures may convey as much information and meaning as possible the details of feed are given from farrowing to weaning, from weaning to 6 months, and from 6 to 12 months which is breeding age.

FEED COST TO RAISE SOW TO BREEDING AGE (ONE YEAR).

Feed of brood sow weaning to farrowing:—

333	pounds	shorts at $24	$ 4 00
93	"	barley at $24	1 12
101	"	rice meal at $24	1 21
20	"	waste grain at $20	20
120	"	potatoes (frozen) at $2	12
950	"	roots at $3	1 42
		Total	$8 07

Feed of brood sow farrowing to weaning, including feed of young pigs:—

1,108	pounds	shorts at $24	$13 29
2	"	bran at $22	2
73	"	crushed oats at $24	87
750	"	skim-milk at $5	1 87
		Total	$16 05
Feed cost of 9 pigs to 10 weeks old			24 12
" 1 " 10 "			2 68

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Feed for pigs from 10 weeks to 6 months:—

200	pounds	shorts at $24	$2 40
44	"	crushed oats at $24	52
264	"	skim-milk at $5	66
		Total	$3 58

Feed for sow from 6 months to 1 year:—

456	pounds	shorts at $24	$ 5 47
153	"	ground barley at $24	1 84
73	"	rice meal at $24	87
875	"	roots at $3	1 31
120	"	potatoes (frozen), at $2	12
		Total	$9 61

Summary of feed cost to raise young sow to breeding age (one year):—

Brood sow and litter farrowing to weaning pigs	per pig	$ 2 68
Young sow 10 weeks to 6 months		3 58
Young sow 6 months to 12 months		9 61
Total		$15 87

Four boars stood for service in the herd for various portions of the year and some few outside sows were bred in addition to those of our own herd.

Feed for boar for 1 year:—

35	pounds	corn meal at $36	$ 63
1,850	"	shorts at $24	22 20
182	"	oat chop at $24	2 18
95	"	bran at $22	1 04
40	"	roots or green feed at $3	1 26
		Total cost of feed for one year	$27 31

On account of having no pastnre it was necessary to feed the boars fairly heavily to keep up condition. Severe weather conditions also rendered an unusually high amount of feed necessary.

At the beginning of the year the boars were penned in yards fenced by 1- by 6-feet rough lumber running cross wise and spaced 4 inches apart. The sows had access to these fences and so much trouble and danger of accidental breedings were occasioned that the boars were finally yarded in with a tight board fence 5 feet high. To make sure of no exit or entrance being made by rooting a double strand of barbed wire was strung beneath the fence and much greater satisfaction has been experienced in handling the boars in these new pens. As with the sows, the only shelter the boars have had has been the "A"-shaped cots and a little shade. The yards are fairly large and the boars obtain plenty of exercise.

PROGRESS OF SWINE FEEDING EXPERIMENTS.

In connection with the rice meal experiments the work undertaken this year is a series of experiments to ascertain the optimum quantity of inorganic phosphorus necessary to counteract the apparent lack of phosphorus in rice meal. Results of the work done in 1914-15 clearly indicated that inorganic phosphorns, at least with the type of meal used during that year, counteracted from a feeder's point of view the injurious effects of heavy feeding of rice meal.

In the past two years work it has been noticed that the shipment of rice meal from different sources varied greatly in quality and varied also in their effects upon the pigs. To overcome this difficulty in experiments that had to be conducted most carefully a large quantity of rice meal was secured from one source. This material was the same as that used in the last few weeks to finish off the experiments of 1914-15. Although no chemical analysis was available to prove that it was the same or different in composition from that used early in the year, the experiments were all started with this food.

Twenty-four pigs were used in this experiment arranged in groups of four each (66 and 71-75). The ground rock phosphate was given to the pigs in the first group at the rate of 10 grammes per pig per day and each succeeding group received an increase of 5 grammes per day until the last group consumed 30 grammes per pig per day, or three times the quantity of the first group. The ration consisted of rice shorts, skim-milk, and green food. The hogs were fed 137 days except the control pen which was butchered at the end of ninety-seven days. The following protocol of the experiments graphically illustrates results obtained from this particular consignment of food:—

		Pen No. 66	Pen No. 71	Pen No. 72	Pen No. 73.	Pen No. 74.	Pen No. 75.
Grammes ground rock phosphate per pig per day		Control.	10	15	20	25	30
Nutritive ratio of ration		1 : 3·56	1 : 7·34	1 : 7·34	1 : 7·34	1 : 7·34	1:7·3
Numbers of pigs in pen		4·0	4·0	4·0	4·0	4·0	4·0
Average age at beginning	Days.	121·0	90·0	85·0	86·0	83·0	87·0
Total weight at beginning of experiment	Lb.	218·0	190·0	189·0	190·0	185·0	168·0
Total weight at end of experiment	"	618·0	648·0	633·0	622·0	659·0	629·0
Average daily gain per pig	"	1·03	0·835	0·81	0·788	0·865	0·841
Duration of feeding period	Days.	97·0	137·0	137·0	137·0	137·	137·0
Food consumed per hundred pounds gain—	Lb.						
Wheat shorts	"	254·0					
Rice shorts	"		315·0	324·8	338·8	300·4	314·9
Skim-milk	"	242·5	300·2	309·7	318·3	290·0	298·2
Green food	"	217·5	277·0	286·0	294·0	267·0	275·7
Ground rock phosphate	"		2·6	3·9	5·2	6·43	7·98
Cost to produce 100 pounds gain	$	4·10	4·48	5·16	5·32	4·83	5·05
Total weight of viscera—	Lb.						
Heart and lungs	"	9·25	13·0	11·9	12·1	10·7	14·1
Liver	"	10·62	14·6	14·2	12·4	13·5	13·1
Remainder	"	62·75	71·9	69·4	72·8	68·7	63·2
Total		82·62	99·5	95·5	97·3	92·9	90·4

A careful study of the above shows that the various amounts of rock phosphate had little or no effect upon the pigs. This lot behaved differently from any lot of pigs we had fed on rice by-product up to this date. On the second day after commencement the pigs were afflicted with a type of scouring which continued in varying intensity until the end of the experiment. The fæces were a light grey colour and had a pungent odour. In contrast to this the pigs in the control pen remained perfectly normal although given the same kind of green food and skim-milk. Just recently this material has been examined by a rice miller and it is claimed by him that this was rice shorts instead of rice meal and that there was a suspected adulteration. It has not been possible to obtain chemical analysis of this material but the miller in question stated that mills could use such material as plaster and cement along with the rice to increase the capacity of the machine, and if such material was used it would pass off with the by-product. It is suspected that some such material as this caused the scouring but the matter still awaits proof. All rice meal fed previous to this had a rather constipating effect, and lack of condition of the pigs

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was always benefited by a dose of Epsom salts, which was frequently administered to the pigs under experiment in 1912-13. It is sufficient to state that this great apparent variation in the composition and the effect on the pigs made the trial a total failure as far as determining the optimum quantity of phosphate needed.

At the same time that the pigs in the trial just mentioned were starting another lot of twenty pigs, divided into five pens (66-70 and 76) was started in an endeavour to prove the same point by a slightly different method. Realizing that a single grain ration is not as palatable or digestible as a mixed grain ration an endeavour was made to improve both of these qualities by the addition of a mixture, termed in the protocol, appetizer. This mixture consists of:—

20 pounds cane sugar.
10 " sodium chloride (common salt).
10 " magnesium chloride.
10 " potassium sulphate.

It was used at the rate of 1 pound of the mixture to 55 pounds of grain. The actual feeding results with this were only a partial success. At the beginning of the experiment the pigs that got appetizer appeared to enjoy their food more than those that did not get it. As far as the scouring was concerned there was no noticeable difference between the various lots when the rice shorts was fed. This was also the case in the non-scouring pens fed on wheat shorts. The following protocol illustrates the results obtained:—

		Pen No. 66	Pen No. 68	Pen No. 67	Pen No. 69	Pen No. 70	Pen No. 76
Grammes rock phosphate per pig per day		.....	.....	.....	.....	40·0	120·0
Grammes appetizer per pound food		.....	10·0	.....	10·0	10·0	10·0
Nutritive ratio of ration		1 : 3·56	1 : 4·04	1 : 7·40	1 : 7·02	1 : 6·91	1 : 7·13
Number of pigs in pen		4·0	4·0	4·0	4·0	4·0	4·0
Average age at beginning	Days.	121·0	101·0	121·0	72·0	88·0	77·0
Average weight at beginning	Lb.	218·0	152·0	330·0	160·0	178·0	155·0
Average weight at finish	"	618·0	497·0	605·0	442·0	450·0	501·0
Average daily gain per pig	"	1·03	0·889	0·708	0·727	0·701	0·850
Duration of feeding period	Days.	97·0	97·0	97·0	97·0	97·0	102·0
Food consumed per 100 pounds gain—	Lb.						
Wheat shorts	"	254·0	244·6				
Rice shorts	"	.....	.....	361·4	293·6	297·4	261·0
Skim-milk	"	242·5	281·1	354·5	345·7	358·4	294·0
Green food	"	217·5	252·1	312·7	308·5	319·8	268·8
Rock phosphate	"	.....	.....	.....	.....	8·66	7·98
Appetizer	"	.....	5·4	.....	6·6	6·6	5·8
Cost to produce 100 pounds gain	$	4·10	4·77	5·69	5·61	5·69	5·06
Total weight of viscera—	Lb.						
Heart and lungs	"	9·25	8·3	11·9	8·1	7·7	8·9
Livers	"	10·62	12·4	13·3	11·8	11·4	11·0
Remainder	"	62·75	64·5	67·4	48·3	46·7	59·9
Total		82·62	85·2	92·6	68·2	65·8	79·8

It will be noticed that the effect of the appetizer was practically nil. Any advantage or disadvantage could easily be accounted for by the individuality of the hogs. This is also true of its effect when combined with ground rock phosphate and fed with this rice shorts. It will also be noticed that in this lot as well as the one previously mentioned, the rock phosphate practically failed to overcome any of the ill effects of this rice shorts. To ascertain the effect of this rice shorts on older pigs, two sows were selected and fed for a period of ninety-eight days, with the following result:—

		Pig No. 2	Pig No. 8
Nutritive ratio of ration		1 : 8·62	1 : 8·43
Age at beginning of experiment		Mature.	19 mos.
Weight at beginning of experiment	Lb.	435·0	235
Weight at end of experiment	"	465·0	310·0
Daily gain per pig		0·306	0·76
Duration of feeding period	Days.	98·0	98·0
Rice shorts consumed per 100 pounds gain	Lb.	2190·0	752·0
Green food consumed per 100 pounds gain	"	2300·0	933·3
Appetizer per 100 pounds gain	"	.....	14·1
Food cost to produce 100 pounds gain		$ 29·73	12·06

The younger sow of the two gave the best final results. Both pigs scoured very badly and the number eight sow refused food intermittently throughout the trial. In order to improve this condition, on the twenty-fifth day appetizer was added to her food giving a slight improvement in her feeding results. Although both pigs put on some flesh, they, in common with the young ones fed, were anaemic and showed the characteristics of rice fed hogs, only in a slighter degree than has been noted before.

In addition to the experiments just mentioned a lot of twenty-eight pigs, divided into seven pens of four pigs each, pens 59-65, were fed on this rice shorts in conjunction with double the quantity of barley. Previous work done with rice meal showed that the injurious effects were noted when it made up only one-third of the ration. Basic slag and ground rock phosphate were used as correctives but the rice shorts failed to behave the same as the rice meal and from all seven pens negative results were obtained in a 100-day feeding period.

Another lot of 49 pigs was divided into ten pens, (77-86), and fed on rice shorts and ground rock phosphate varying in quantity from 8 to 24 grammes per pig per day. Two controls were used and one rice shorts pen was fed green food. In order to eliminate any factors which might be caused by the addition of green food this was dropped from all the rations except one. At the end of the feeding period the ground rock phosphate had not given any results. However, the pen fed on green food made almost double the gain of the pen on the same ration not receiving green food and they were in better health. In order to determine whether a long continued use of this rice shorts could be overcome by the phosphate, two pens (78 and 82) from this lot were kept on and fed for 155 days. Before the end of this time one pig in pen seventy-eight developed what was diagnosed by Dr. Hadwen to be an extreme case of dry beriberi. The other pigs in the same pen were not so badly affected. The following protocol of the experiment illustrates well the results obtained:—

		Pen No. 78	Pen No. 82
Grammes rock phosphate per pig per day			16·0
Nutritive ratio of ration		1 : 7·8	1 : 8·09
Number of pigs in pen		5·0	5·0
Average age at beginning	Days.	88·0	88·0
Total weight at beginning of experiment	Lb.	246·0	228·0
Total weight at end of experiment	"	545·0	612·0
Average daily gain per pig	"	0·38	0·49
Duration of feeding period	Days.	155·0	155·0
Food consumed per 100 pounds gain—	Lb.		
Rice meal	"	516·0	487·0
Skim-milk	"	521·0	403
Ground rock phosphate	"		7·0
Cost to produce 100 pounds gain	$	7·49	6·95
Total weight of viscera—	Lb.		
Heart and lungs	"	10·4	10·6
Livers	"	10·4	10·9
Remainder	"	75·8	80·1
Total		96·6	101·6

In this case where the rice shorts was fed for over five months, the rock phosphate appeared to have some beneficial effect. Pen 82 was healthier and better in every respect for the last forty days of the feeding trial, but the feeding period had to be continued longer in order to obtain the results.

A fresh shipment of rice shorts was obtained and a lot of twenty-four pigs divided into 4 pens (87-90), two of which received ground rock phosphate and two were used as controls. This shorts was supposed to be a selected lot and in appearance it did not seem quite so heavy and calcareous as the first big shipment but had exactly the same effect on the pigs only in a minor degree. The rock phosphate appeared to have more effect in counteracting trouble although not to a very marked degree as will be seen in the following protocol of the experiment:—

		Pen No. 87	Pen No. 88	Pen No. 89	Pen No. 90
Grammes rock phosphate per pig per day			17·0		17·0
Nutritive ratio of ration		1 : 7·26	1 : 7·26	1 : 8·23	1 : 8·23
Number of pigs in pen		6·0	6·0	6·0	6·0
Average age at beginning	Days.	216·0	219·0	229·0	228·0
Total weight at beginning of experiment	Lb.	305·0	309·0	378·0	348·0
Total weight at end of experiment	"	636·0	653·0	739·0	699·0
Average daily gain per pig	"	0·58	0·603	0·633	0·615
Duration of feeding period	Days.	95·0	95·0	95·0	95·0
Food consumed per 100 pounds gain—	Lb.				
Rice shorts	"	432·6	416·2	401·6	413·1
Skim-milk	"	287·0	276·1	263·1	270·6
Mangels	"	344·4	331·4	315·7	324·7
Rock phosphate	"		6·16		6·0
Cost to produce 100 pounds gain	$	6·42	6·27	5·95	6·12
Total weight of viscera—	Lb.				
Heart and lungs	"	13·4	12·8	10·0	13·5
Livers	"	14·5	14·1	15·6	15·1
Remainder	"	97·8	101·0	101·8	102·9
Total		125·7	127·9	127·4	131·5

It is very evident that the material which was used in the experiments this year was of a different nature and had a vastly different effect on the pigs than that which has been used heretofore. In the past rice meal was obtained which varied in quality. This fact was noted in the report on this work for the year 1913-14, Experimental Farms Report, page 720. At that time the rice meal was purchased in small quantities only in order to keep the supply on hand fresh, and at least 80 per cent of the material used was rice meal and not rice shorts. The fact of securing enough material to carry nearly one year's experimental work is responsible for the failure to demonstrate the optimum quantity of ground rock phosphate necessary. In the meantime a great deal has been learned about the different kinds and qualities of so-called rice meal obtained from different sources. It is sufficient to say that the term rice meal is too broad to cover the various types of product found on this coast.

During the past year a great deal of interest has been shown in this work by both millers and feeders. Outside of the dietetic information which may be obtained from the experiment, there is a great deal of commercial information needed by both of the interested parties. The investigation was started for the benefit of the farmers who finding rice meal cheap at certain seasons were tempted to feed large quantities and obtained disastrous results, although it must be noted that some farmers, using it judiciously with other foods, have not had great cause to complain. The millers have in this by-product about 10 per cent of the gross weight of rice handled in their mills and it is of considerable economic importance to them to get this material disposed of in a profitable and satisfactory manner. Just at the close of the year upon searching

for information some of the millers have not been sparing in their endeavour to give information with regard to various types of rice by-product and have offered all the support they were able to give. The work which is now under way for the coming year has been conducted with several grades of rice meal and shorts in an endeavour to learn:—

First.—Why injurious effects result from the feeding of this by-product in large quantities.

Second.—How they may be counteracted and the product profitably used for cattle, hogs and poultry.

EXPERIMENTAL STATION, SIDNEY, B.C.

REPORT OF THE SUPERINTENDENT, LIONEL STEVENSON, B.S.A., M.S.

SWINE.

The work with swine at this Station was limited to the feeding of a few barrows, as there are neither buildings nor equipment for more extensive operations with swine. In May, two grade Tamworth-Berkshires were purchased, primarily as scavengers, to prevent waste of vegetable materials from the garden. Accurate records were kept of the feeds consumed by these animals, and the following figures may be of interest:—

Date started		May 15.
Total weight of two pigs	lb.	24
Price paid for two pigs	$	6 00
Length of feeding period	days.	149
Weight of two pigs at end of feeding period	lb.	420
Gain in weight	"	396
Value of grain fed	$	7 85
Value obtained for vegetable material	"	23 95

From the above table it will be noted that the greater portion of the nutrition of these two pigs came from materials that would have otherwise been wasted. On every farm on Vancouver island a number of swine should be kept in order to utilize vegetable materials to best advantage.

In November, nine barrows of Yorkshire breeding were bought, primarily to utilize the root crop and to prevent the heating of the manure from the horse stable.

Date started		November 12.
Total weight of nine pigs	lb.	279
Price paid for pigs	$	52 00
Length of feeding period	days.	134
Weight of pigs at end of period (March 25)	lb.	1,280½
Gain in weight		1,001½
Amount of wheat middlings consumed		3,330
Amount of milk consumed	"	491
Amount of roots consumed	"	5,180
Sale value of nine pigs	$	134 41
Value per ton obtained for roots fed	"	13 20

Milk was charged at 1 cent per pound and middlings at $26 per ton.

From the above figures it will be noted that a value of $13.20 per ton was obtained for the roots fed. This was $6.20 per ton more than roots were selling for in the district at the time. In addition to the "on the farm market" obtained for the roots, a quantity of valuable manure was made.

APPENDIX TO THE REPORT OF THE MINISTER OF AGRICULTURE

EXPERIMENTAL FARMS

REPORTS FROM THE

DIVISION OF HORTICULTURE
DIVISION OF CEREALS

FOR THE YEAR ENDING MARCH 31, 1916.

PRINTED BY ORDER OF PARLIAMENT.

OTTAWA
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1917

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DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

REPORT

FROM THE

DIVISION OF HORTICULTURE

For the Year ending March 31, 1916

PREPARED BY

The Dominion Horticulturist, Central Farm, Ottawa. - W. T. Macoun.

Superintendent—
Experimental Station, Charlottetown, P.E.I. - - - J. A. Clark, B.S.A.
Experimental Farm, Nappan, N.S. - - - - - - W. W. Baird, B.S.A.
Experimental Station, Kentville, N.S. - - - - - W. S. Blair.
Experimental Station, Fredericton, N.B. - - - - W. W. Hubbard.
Experimental Station, Ste. Anne de la Pocatière, Q. Jos. Bégin.
Experimental Station, Cap Rouge, Que. - - - - G. A. Langelier.
Experimental Station, Lennoxville, Que. - - - - J. A. McClary.
Experimental Farm, Brandon, Man. - - - - - - W. C. McKillican, B.S.A.
Experimental Farm, Indian Head, Sask. - - - - T. J. Harrison, B.S.A.
Experimental Station, Rosthern, Sask. - - - - - W. A. Munro, B.A., B.S.A.
Experimental Station, Scott, Sask. - - - - - - M. J. Tinline, B.S.A. (Acting).
Experimental Station, Lethbridge, Alta. - - - - W. H. Fairfield, M.S.
Experimental Station, Lacombe, Alta. - - - - - G. H. Hutton, B.S.A.
Experimental Farm, Agassiz, B.C. - - - - - - P. H. Moore, B.S.A.
Experimental Station, Invermere, B.C. - - - - - G. E. Parham.
Experimental Station, Summerland, B.C. - - - - R. H. Helmer.
Experimental Station, Sidney, B.C. - - - - - - Lionel Stevenson, B.S.A., M.S.
Experimentalists of Substations at Salmon Arm, B.C., Fort Vermilion, Grouard, Grande Prairie, and Forts Resolution, Providence and Smith, in northern Alberta,—also tests made at Hudson Hope, Peace River, B.C.

REPORT OF THE DIVISION OF HORTICULTURE

OTTAWA, March 31, 1916.

J. H. GRISDALE, Esq., B.Agr.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith the twenty-ninth annual report of the Division of Horticulture, being the eighteenth since I took charge of the Division.

There will be found included in this report, the reports of the work at the Central Farm, Ottawa, and those which have been written by the Superintendents of the Experimental Farms and Stations at Charlottetown, P.E.I.; Nappan, N.S.; Kentville, N.S.; Fredericton, N.B.; Ste. Anne de la Pocatière, Que.; Cap Rouge, Que.; Lennoxville, Que.; Brandon, Man.; Indian Head, Sask.; Rosthern, Sask.; Scott, Sask.; Lethbridge, Alta.; Lacombe, Alta.; Invermere, B.C.; Summerland, B.C.; Agassiz, B.C.; Sidney, B.C. There is also a report from Thos. A. Sharpe, Salmon Arm, B.C., and from the Sub-Station at Fort Vermilion, Peace River district, Alta.; Grouard, Lesser Slave lake, Alta.; Grande Prairie, Alta., and Fort Resolution, Fort Providence and Fort Smith in Northern Alberta. There is also a report of some tests made by Dr. Wm. Greene, Hudson Hope, Peace River, B.C.

The report of the horticultural work on the Central Farm has again been divided, as in the two previous years. The introductory and more general matter and some of the details with which I have had intimate association were prepared by myself, while most of the experimental work is reported upon by the assistants in charge of special parts of the work. The Assistant in Vegetable Gardening being still at the front, his work is being looked after by the Assistant in Pomology, who has prepared a report upon the work in Vegetable Gardening for the year.

BRANCH FARMS.

A considerable part of the writer's time, each year, is taken up in either visiting the Branch Farms and Stations, or in work connected with them at Ottawa, such as the ordering of material for them and arranging to ship supplies from Ottawa; and in editing the horticultural reports sent in by the Superintendents. There is also much correspondence with the Superintendents in regard to many things throughout the year. Every week the Superintendent sends a report to Ottawa giving an account of the work done the previous week, which enables the Horticultural Division to keep in close touch with the work. All records of horticultural experiments at the branch Farms and Stations are kept in duplicate and one copy is sent to the Central Farm each year when such data as are required for reference at Ottawa are copied on to cards, the whole forming a central card index system which makes it easy to refer to anything connected with horticulture at any of the Farms or Stations.

Following a meeting of the Superintendents at Ottawa in January, 1915, for the discussion of the work, I prepared a series of cultural experiments with vegetables, which it was proposed to carry out at all the Farms and Stations. These experiments were begun in 1915 and will be continued for from three to five years, and already very useful results have been obtained.

A visit to the western Farms and Stations was made in the spring of 1915, and again in the summer.

Agassiz.—Leaving Ottawa on March 23, I reached Agassiz, B.C., on March 27. Great improvements had been made in the grounds since the previous year. A number of poor old hedges had been removed, the old yard behind the house had been cleaned up and the grounds on the whole were in better condition. The trees and bushes in the farmers' orchard looked well, though a few Rome Beauty apple trees were already showing the Apple Tree Anthracnose which caused so much injury in the old orchard. It was suggested that the trees of this variety be removed and be replaced by another sort. Agassiz was visited again on August 18, when the improvement noticed in the appearance of the ornamental grounds was again marked. It was suggested at this time that a number of old shrubs on the west side of the house should be removed to still further improve the grounds. At this time the various experiments under way were gone over with the Superintendent.

Sidney.—The Experimental Station at Sidney, B.C., was visited on March 29, and succeeding days. While there I made a detailed planting plan of a 6-acre orchard for walnuts, persimmons, and chestnuts, also a plan in detail of the north arboretum border, also plans of fig, filbert, and pomegranate plantations, and a small vineyard, as well as one for miscellaneous economic plants. I also planned the planting of the banks of the pond on both sides of the bridge on the main avenue. It was also arranged to extend the planting of trees on the East Saanich road towards Sidney by the use of oriental plane trees. The trees and bushes in the various plantations made in 1914 were found to have become well established on the whole. Paths were staked out through the woods below the East Saanich road. On a second visit to the Sidney Station on September 11, I discussed with the Superintendent the possible desirability, in view of the many picnics which would probably be held at the Station in the future, of clearing out the underbrush in, at least, part of this grove, the first plan being to leave the woods in as natural a condition as possible. While at Sidney, it was arranged to send some tulip bulbs grown at this Station, to a number of the Eastern Stations for comparison with imported bulbs, looking to the possibility of ultimately supplying the whole Farms system with bulbs grown at the Sidney Station.

Summerland.—On April 7, I visited the new Experimental Station at Summerland, B.C., and went over the ground of the proposed horticultural plantations. An extensive series of cultural experiments bearing particularly on problems of irrigation had been planned in the winter, and the area where these were to go was chosen on the bench just below where the buildings are to be, the variety tests being elsewhere. As there was no water available at planting time, it was decided to defer the main planting until the spring of 1916, but a few apple trees were set out to test planting without irrigation. It was planned to have the ornamental grounds extend from the Canadian Pacific Railway bridge along the edge of the ravine to opposite the site chosen for the Superintendent's house. This should, in time, be a very striking feature of the Station, as the ravine at this point is very deep and rugged. A further area south of the grove below the Canadian Pacific railway was planned for the testing of ornamental trees and shrubs. I was again at Summerland on August 14, when further plans for future planting were made with the Superintendent, since spring flumes had been constructed and water for irrigation made available. I spent some time with the Superintendent in visiting the fruit district about Summerland and learning as much as possible about horticultural conditions there.

Invermere.—On April 9, the Invermere Station was visited. Most of the trees, shrubs and herbaceous plants were found to have wintered satisfactorily. At this time I planned, with the Superintendent, the site of the ornamental hedges, decided on the varieties, and ordered most of them. A plan of the ornamental grounds was also decided upon, and arrangements made for the seeding down to lawn grass of

areas in front and at the side of the Superintendent's house. While at Invermere, neighbouring places were visited to obtain further information as to what things were succeeding in this district. Invermere was again visited on August 10 to 12, when some further plans were made with the Superintendent in connection with the horticultural work. These included a long perennial border extending along the side of the road from the main entrance to near the Superintendent's house; a long hedge separating the ornamental grounds from the fields was also suggested.

Lethbridge.—The Experimental Station at Lethbridge, Alta., was reached on April 12, 1915, when the various plantations were gone over with the Superintendent. A new orchard on the part of the Farm near the railroad for the seedling apple trees being grown in nursery rows was arranged for. Out of several thousand seedlings of Russian apples grown at this Station, it is expected that something very suitable for the climatic conditions of southern Alberta will be obtained. A group of spruce and cottonwoods was planned east of the entrance, and groups of *Syringa villosa, Spiræa arguta,* and *Cornus alba sibirica* along the east side of the road from the entrance as part of the planting scheme for the new lawn. On August 7, I was again at Lethbridge, when the horticultural area looked well. A number of varieties of apples, including Yellow Transparent, Duchess of Oldenburg, Lowland Raspberry and Charlamoff were fruiting. Some 2,000 seedling apple trees had been set out on the area above mentioned, most of which had grown. The trees and shrubs which are planted along the different boundaries of the Farm as an arboretum being difficult to look after under the present arrangement, and the hardy and tender sorts now having been determined, it was suggested that within a reasonable time and after full notes had been taken these rows of trees and shrubs should be taken out and a compact arboretum of the hardy varieties established of about an acre in the south-east corner of the Farm.

Lacombe.—The Experimental Station at Lacombe, Alta., was visited on April 13. It was decided, on consultation with the Superintendent, that it would be desirable to leave most of the seedling apple trees in the original rows in the orchard and let them fruit, if they will, in these rows. The willow hedges are now making much-needed windbreaks for the orchards here. An extension of the gooseberry plantation was decided upon. Some new groups of trees and shrubs were planned on the ornamental grounds and a laurel-leaved willow hedge was planned along the road between the barn and the new office, making with the present laurel-leaved willow hedge an additional protected area for vegetables. Lacombe was again visited on August 6, when a marked improvement was found in the appearance of the horticultural area over last year. At this time it was planned to run a flower border in front of the new laurel-leaved willow hedge above mentioned.

Scott.—On April 15, I was at the Scott Experimental Station and went over the plantations with the Acting Superintendent. The using of Manitoba plum seedlings as fillers between the apple trees in the orchards was suggested. An extension to the strawberry plantation was decided upon. Places were marked for additions to groups of trees and shrubs on the lawns. Scott was again visited on August 5. Considering the few years this Station has been established, the development in horticulture has been very great. A few crab apple trees are already fruiting. Horticulture at this Station is already attracting much attention in the district.

Rosthern.—A visit was paid to the Rosthern Station on April 16. It was decided at this time to leave most of the Russian seedling apples to fruit in the original rows, if they prove hardy enough, thinning out the tenderer ones as may be necessary. An extension to the plum orchard was planned. Additional sample hedges were decided upon. I was at Rosthern again on August 4, when the experiments in progress were gone over with the Superintendent.

OTTAWA.

Indian Head.—I spent April 17 at the Indian Head Farm. At this time plans were made for filling the vacancies in the various orchards. It was planned to remove every two rows of the Russian apple seedlings after this year, leaving the rows 9 feet apart and let the trees fruit in the remaining original rows. An extension to the gooseberry plantation was decided upon. Experiments with different lawn grass mixtures were suggested for the small area behind the office. It was arranged to widen the main entrance by removing several rows of trees from the forest belt on both sides and to continue the ash avenue outside the Farm to meet the maple avenue inside. A laurel-leaved willow hedge was planned, to run from the office to the hot-house on the south side of the present row of maples and poplar to make a better background for the flower border. On August 3, I was again at Indian Head and discussed the horticultural work with the Superintendent. It was suggested at this time to plant a Caragana hedge on three sides of the new four-acre area to be devoted to fruits and vegetables. A few additional flower beds were planned for near the Superintendent's house to give more colour during the summer months.

Brandon.—The Brandon Farm was visited on April 19, when the various plantations were gone over with the Superintendent. The situation of the orchard at Brandon is particularly trying to apple trees and there are few trees of the Russian apple which have proved so hardy in some parts of Manitoba that are hardy here. The Russian apple seedlings, of which several thousand are growing at each of the prairie Farms, have killed back worse here than at the other Farms. It was decided to remove three of the poorest sample ornamental hedges. I was again at Brandon on August 2, when the horticultural work was discussed with the Superintendent.

Morden.—The new Experimental Station, Morden, Man., was visited on April 20, when it was arranged to have *Caragana arborescens* and laurel-leaved willow hedges planted in a ten-acre field for protection for fruit trees, which were to be planted in 1916. The material for these hedges was ordered by me and they were planted during the spring. When at Morden again on July 30 and 31, I found that they had become well established. The Caragana hedges were planted 90 feet apart east and west in the field. A good many seedlings had grown from seed of Caragana, Manitoba maple and green ash, which had been sown in the spring.

Kapuskasing.—The internment camp at Kapuskasing, Ont., was visited on May 22 and 23, to get a better idea of the horticultural possibilities of this part of Ontario preparatory to starting work on what will be an Experimental Station. This situation seems as favourable for fruit and vegetables as any which could be obtained in the clay belt. There is good drainage for the soil into the river which flows past the Farm. After visiting Kapuskasing, seeds of different kinds of vegetables and flowers were sent there for test. I was again at Kapuskasing on September 17-19, and took notes on the results obtained from sowing this seed. A site for the first orchard and fruit plantations was selected, and on my return to Ottawa material for these was shipped there.

Spirit Lake.—The internment camp at Spirit Lake, Que., was visited on May 21, when arrangements were made for the testing of vegetables and flowers, as at Kapuskasing. The soil at Spirit Lake will, it is believed, be very suitable for tree fruits on certain parts of the Farm, which is sandy and stony. Spirit Lake was again visited on September 20-22, when notes were made on the growth of things which had been tested during the season. A supply of fruit trees and bushes was sent there on my return.

Cap Rouge.—The Experimental Station at Cap Rouge was visited on June 8, and again on October 21, when the various experiments which are being carried on at this Station were gone over with the Superintendent. The orchards at this Station

are now beginning to bear, and very interesting results have already been obtained in many lines of work. In view of some loss last winter from root-killing on the top of the hill in the orchard where the snow blows off easily, it was suggested to mulch the ground about the trees with straw in future, or until the trees hold the snow more.

Ste. Anne de la Pocatière.—The Ste. Anne Station was visited on June 9, and October 20. Fruit trees for an additional area of about three acres had been ordered by me and these had been planted. The plantings of the two previous seasons had become well established and there is now an orchard of about ten acres of tree fruits here. Plans were made for supplying fillers for part of the apple orchard and for a new strawberry plantation. Good progress has been made in a short time at this Station.

Lennoxville.—I was at the Lennoxville Station on May 11, July 25, and October 19. On the first visit the orchards were being laid out, my assistant, Mr. M. B. Davis being there to help in this. Plans in detail were made at Ottawa showing the positions of the trees and small fruits and the variety and cultural tests, and trees and bushes were ordered for the same. These were planted in good season and the proportion of loss was small. Some 24 acres in all were planted with fruits. Experiments with vegetables and flowers were also planned. Sample ornamental hedges were put out and the horticultural work at this new Station was got well under way this year, and already it has received much attention from people in this district, the vegetables and flowers, especially, looking particularly well.

Fredericton.—July 24 was spent at the Fredericton Station. Absence of snow the previous winter and weather alternating between thawing and freezing had made conditions favourable for root-killing, and there were a considerable number of trees killed making vacancies in the orchard. A small vineyard was planned for the slope above the variety apple orchard. Potatoes are a specialty at this Station and the various experiments were gone over with the Superintendent at this time. The site of the ornamental hedges was decided upon and later in the season these were planted with the aid of my assistant, Mr. F. E. Buck, who went from Ottawa for this purpose and also to plan and plant other parts of the ornamental grounds.

Nappan.—A visit was paid to the Nappan Farm on July 23. It was a very late season in this district and vegetation was not so far advanced as usual. The different plantations were visited and the experiments discussed with the Superintendent. The young orchard planted a few years ago with the varieties of apples which have succeeded best at Nappan looked well. A record is being kept of the cost of developing this orchard.

Kentville.—The Kentville Station was visited on July 18 and 19. There is a large number of experiments being carried on in horticulture at this Station. Some fifty acres are now under fruit and there are many plots of vegetables and flowers. Already this Station has become a bureau of information for the Annapolis Valley on horticultural matters. During my stay here, I drove with the Superintendent to Berwick and went over the spraying experiments being carried on under the direction of the Kentville Station in an orchard there.

Charlottetown.—I was at Charlottetown on July 21, when the lateness of the season as compared with other parts of the Dominion where Farms or Stations are established was very marked. The strawberry season was little more than begun; lilacs were still in bloom. The trees in the apple, plum and cherry orchards here are not making very good growth, as the situation is a very exposed one. The small pear orchard near the Superintendent's house was considered out of place there, and it was decided to move the trees to another situation. The people of Prince Edward Island

are making more and more use of this Station to obtain information in regard to fruits, vegetables and ornamental plants. The latter have been very attractive.

Salmon Arm, B.C.—On August 17, I paid a visit to Mr. Thos. A. Sharpe, Salmon Arm, B.C., who reports on the varieties of fruits growing in his orchard and the neighbouring district, and who sends a weekly report to the Horticultural Division on horticulture in the Salmon Arm district.

MEETINGS, ADDRESSES AND PLACES VISITED BY THE STAFF OF THE HORTICULTURAL DIVISION.

A good deal of the time of some members of the staff of the Horticultural Division is taken up each year in attending meetings, in giving addresses, and in becoming better acquainted with horticultural conditions in different parts of Canada, and occasionally, in other countries.

When visiting the Kentville Station in 1915, I visited parts of the Annapolis Valley with the Superintendent, and when West visited the Windermere, Summerland, Vernon, and Salmon Arm districts of British Columbia. From the western Experimental Farms and Stations I went to California to attend the meetings of the American Pomological Society and the Society for Horticultural Science held at Berkeley and to visit, with the members of the former society, the different fruit districts of California and the Panama Pacific and San Diego exhibitions. I joined the party at San Diego and after seeing the exhibition there, the important fruit centres of Los Angeles, Pasadena, San Dimas, Pomona, Whittier, Fresno and other places were visited. While I was impressed with the great resources of California from a horticultural standpoint I feel convinced that, notwithstanding the variety of fruits which can be successfully grown there, Canada offers as good or better prospects of success to a fruit grower than does California. The returns to Californians on some crops in 1915 were very low. The famous plant breeder Mr. Luther Burbank was visited at his home and trial grounds, Santa Rosa, California, and he very courteously showed us over his place and explained the work he was doing.

The Panama Pacific exhibition was visited and the Canadian exhibit found to be one of the most attractive, educational and striking features of it. It received the highest praise from the visiting horticulturists. The exhibit of apples, most of which had been kept in cold storage since the previous year, was particularly fine, and the fruit in preservatives in bottles was in excellent condition, its natural appearance being a tribute to the skill with which the fruit and preservatives are handled.

On September 11, on my return from the United States, I gave an address in Victoria, B.C., on "Vacant Lot Gardens and Vegetable Seed Production." I attended the meeting of the Ontario Horticultural Association on November 10 and 11, and read a paper on "California in Summer from a Horticultural Standpoint" and also presented a descriptive list of "Twenty-five Best Pæonies". I also attended a meeting of the Ontario Vegetable Growers' Association at Toronto the same week. The annual meeting of the Quebec Pomological Society was attended on December 9 and 10, when I read a paper on "Horticultural Work at the Dominion Experimental Stations in the Province of Quebec." At the annual meeting of the Ontario Agricultural and Experimental Union held at the O.A.C., Guelph, Ont., on January 10 to 12, 1916, an address on "Important Factors in Connection with Ontario Fruit Growing" was given, and at the annual meeting of the Ontario Fruit Growers' Association held in Toronto on January 18 to 20, one on "Results of Work in Producing New Fruits at Ottawa". On January 25, I gave an illustrated lecture on the "Use of Ornamental Trees and Shrubs" before the Ottawa Field Naturalists' Club, Ottawa. The meetings of the Niagara Peninsula Fruit Growers' Association were attended at Grimsby and St. Catharines on February 23 to 25, when addresses were given on "Pruning Practices", "Apples, Best Varieties for Profit", "Small Fruits, Varieties and Conditions for Growth." A convention of New Brunswick Potato Growers was

held at Woodstock, N.B., on March 22 and 23 during which a New Brunswick Potato Growers' Association was formed. At this meeting I gave an address on "The Potato and its Culture".

Mr. M. B. Davis, Assistant in Pomology, visited a number of places during the year for various purposes. Before installing the irrigation plant for vegetables at Ottawa he went to the Vineland Station, Ont., where a system was installed in 1914, in order to obtain any information that might be useful at Ottawa. On May 2 he went to the Lennoxville Station and assisted in the laying out and planting of the orchards there. On June 7 he visited the cranberry bogs in the Annapolis Valley, N.S., to obtain information in regard to cranberry growing for a bulletin now in press, and from August 28 to September 4 he made a trip to Cape Cod, Mass., for the same purpose. On September 8 and 9 he judged field crops of beans, potatoes, carrots and beets in Wright county, Que. On September 24 he judged the vegetables at the School Fair at Shawville, Que. On January 20, 1916, he addressed the annual meeting of the Nova Scotia Fruit Growers' Association at Wolfville, N.S., on pruning. This address met with such a good reception that his services were asked for to deliver a number of addresses on the same subject at a number of different points. He, therefore, addressed meetings at Kingston, N.S., on February 14; Aylesford, February 15; Canning, February 16; Woodville, February 17, and Berwick, N.S., on February 18.

Mr. F. E. Buck, Assistant in Ornamental Gardening, visited the following places for the purpose mentioned: On April 13 he addressed the Carleton Place Horticultural Society on "Improving the Home Grounds." He visited the Farnham Tobacco Station on April 30 and planted the grounds; the Experimental Farm, Nappan, N.S., on May 12 to 17 to plan and do some planting on the grounds and particularly on a new perennial border. He attended the annual meeting of the Canadian Horticultural Association at London, Ont., on August 2 to 5, and gave a paper on "Works and Aims of Special Committee on Plant Nomenclature," and at a meeting of the Women's Institute, Elgin, Ont., August 12, an address on "Easily Grown Flowers." He judged lawns and gardens at Carleton Place, Ont., on August 21, and at Westboro on August 27. On August 31 he addressed the Ottawa Horticultural Society on "Annuals." Flower shows were judged by him at Carleton Place, Ont., on September 3, and at Smiths Falls, Ont., on September 11. He visited the Fredericton Experimental Station on October 12 to 17 to plant the sample hedges and do other work in connection with the ornamental grounds there. At the Horticultural Society of Winchester, Ont., he gave an address on "Popular Flowers" on November 2. He presented the report of the Names Committee at the Ontario Horticultural Association held in Toronto, November 9 to 11. At the Short Course at Macdonald College, February 10 and 11, 1916, he gave an address on "The Improvement of Home Grounds and Work at the Central Experimental Farm." On March 15 he addressed the Toronto Horticultural Society on "Annuals."

Mr. A. J. Logsdail, Assistant in Plant Breeding, made several journeys to gather material and information for his work. On June 5 he made a trip up the Gatineau Valley for the special purpose of locating plants of the wild blackberry in order later on to cross this with the cultivated varieties to obtain hardier and better sorts. He visited the Experimental Station, Lennoxville, Que., on September 22 to examine material for breeding which was growing there. He attended the meetings of the Ontario Horticultural Association, Toronto, Ont., on November 10, and on the 11th the meeting of the Ontario Vegetable Growers' Association, at which he gave an address on "Seed Production." He attended a meeting of the Ontario Fruit Growers' Association, Toronto, Ont., on January 20, 1916, and on January 22 addressed the London Branch of the Ontario Vegetable Growers' Association on "Seed Production for the Market Gardener."

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MATTERS OF SPECIAL INTEREST FOR THE YEAR.

Perhaps the most noteworthy undertaking in the Horticultural Division in 1915 was the installation at the Central Farm of an overhead irrigation system covering seven acres of land devoted to vegetable and strawberry experiments. By special arrangement with the city a certain maximum quantity of water sufficient for the needs of the work was allowed. This water is first pumped into a large tank and then sent by gravity to the pipes in the field. Further details in regard to this installation will be found in another part of the report.

A fine Chrysanthemum show in the new greenhouses in the autumn induced hundreds of people to come from the city to see it and, at the same time, they became acquainted with the other experiments with plants in the greenhouses.

A power mower was obtained for the lawns this year.

A radical change was made in the method of labelling fruit trees in the orchards. By the system of keeping the yields from each individual tree it is necessary to have each tree labelled so that the name and number of the tree does not have to be looked up in the book each time. No kinds of metal labels attached to the trees have proved entirely satisfactory, the name being either hard to read or the labels difficult to find. By the new arrangement each tree is labelled with a small wooden label or stake painted white with black letters and driven into the ground close to the tree on which is written the name of the variety, the date of planting, and the row and tree number. These can be easily read without going close up to them and make the work of recording much easier and quicker, and visitors to the Farm who seldom read the label on the trees can now see at a glance what the tree is. This label may not prove permanently satisfactory, but it is, at least, promising.

PUBLICATIONS.

The following bulletins, pamphlets and articles have been published by the Horticultural Division during the year, besides the Annual Report. In addition to these there are the many papers recorded under the chapter on Meetings and Addresses, and which were published in the annual reports of the various societies before which the papers were given.

Hardy Roses, Their Culture in Canada, Bulletin No. 85, by W. T. Macoun and F. E. Buck, B.S.A.

Planning the Home Lot, Exhibition Circular No. 39, by F. E. Buck, B.S.A.

Beautiful Homes and How the Farmer May Make Them, Exhibition Circular No. 40, by F. E. Buck, B.S.A.

Asparagus, Celery, and Onion Culture, Pamphlet No. 5 Revise, by W. T. Macoun.

Top-grafting, Exhibition Circular No. 15, Revise, by W. T. Macoun.

Factors Influencing the Profitable Production of Potatoes, Exhibition Circular No. 83, by M. B. Davis, B.S.A.

The Cultivation of Small Fruits, Exhibition Circular No. 84, by M. B. Davis, B.S.A.

The following contributions were made to the *Agricultural Gazette of Canada* by the Horticultural Division.

April 1915—Growing Potatoes for Home and Market, by W. T. Macoun.

July 1915—Further Experiments with Fire Pots in Preventing Frost, by M. B. Davis, B.S.A.

August 1915—Vegetable Gardening, by M. B. Davis, B.S.A.

Plant Breeding Work, by A. J. Logsdail, B.S.A.

Ornamental Gardening, by F. E. Buck, B.S.A.

January 1916—Experiments in Growing Vegetable Seeds in 1915, by W. T. Macoun and M. B. Davis, B.S.A.

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CORRESPONDENCE.

The correspondence has always been looked upon as one of the most important parts of the work of the Horticultural Division. One may publish the results of experiments in the annual reports and in bulletins, but these publications, valuable as they are, may not contain just the information the individual wants, nor may they reach him at the time when he needs it. When, however, a man or woman writes a letter asking for definite information on some special subject and he or she gets a prompt reply, the information given may be, and has proved to be, worth much to the correspondent. It is a matter of gratification to find that the correspondence of the Horticultural Division is steadily and rapidly growing, notwithstanding the many other means by which Canadians can obtain horticultural information. As stated in the report last year, a much greater interest in horticulture has been noticed since the depression in real estate in Canada and since the outbreak of the war. Canadians seem to be placing a higher value on home life and home surroundings than they ever did before. During the fiscal year, 1915-16 there were 7,249 letters received and 9,007 despatched, the difference between letters received and letters despatched being largely due to the letters received by the Division of Extension and Publicity and transferred to the Horticultural Division. During the past two years there has been an increase each year of more than one thousand letters.

DONATIONS.

As in past years there was a number of donations to the Horticultural Division in 1915. These, are, herewith, gratefully acknowledged.

FRUITS.

Sender.	*Donation.*
Cass, C. A., L'Orignal, Ont.	Apple Scions.
Dunning, E., Ottawa, Ont.	Pits from Seedling of Green Gage.
Fournier, L., Lachute, Que.	Fameuse Apple Scions.
Hansen, N. E., South Dakota Experimental Station.	Scions of Red Wing Apple and Waneta and Kahinta Plums.
Henderson, Mr., Ottawa, Ont.	Scions of Winter Banana Apple
Jones, Harold, Maitland, Ont.	Scions of Unknown Apple.
Mullen, Mr., Cambray, Ont.	Apple Scions.

VEGETABLES.

Fairfield, F. S., Orono, Ont.	Potatoes-Seedling of Aroostook Wonder, Extra Early Surprise, Ontario Wonder. Beans, Extra Early Aroostook Kidney, Yellow Eyed. Turnip Seed-Irish Turnip.
Gordon, F. M., Seal Cove, N.B.	Seedling Potato.

ORNAMENTAL PLANTS.

Barr and Sons, London England.	Flower seeds.
Burpee, Atlee, Co., Philadelphia.	Flower seeds.
City Greenhouses, Toronto, Ont.	Cuttings of Double White Petunia.
Skinner, F. L., Dropmore, Man.	Bulb of *Lilium regale.*
Sutton and Sons, Reading, England.	Flower seeds.
Sydenham and Co., Birmingham, England.	Flower seeds.
Temple, Mrs., Salmon Arm, B.C.	Geraniums.

PLANT BREEDING.

Butler, N. E., Weymouth, N.S.	Two samples of bean seed of Apparent Hybrid origin.
Horticultural Experimental Station, Vineland, Ont.	Seeds and plants of Native species of Aquilegia.
Howitt, H. M., Dept. of Agriculture, Prince Rupert, B.C.	Seed of Native Strawberries, Atlin, District, B.C.
McLeod, D. P., Gould Station, Que.	Seed of garden pea, Hybrid origin.
Payment, Mrs John, Bangscote, Bangs Falls, N.S.	Seed of Lupine.

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ACKNOWLEDGMENTS.

Acknowledgments are again due and are gratefully rendered to the following members of the staff of the Horticultural Division who, in one responsible position or another, have made it possible to accomplish what has been done during the past year. Mr. M. B. Davis, B.S.A., Assistant in Pomology; Mr. F. E. Buck, B.S.A., Assistant in Ornamental Gardening; Mr. A. J. Logsdail, B.S.A., Assistant in Plant Breeding; Mr. M. D. McCallum, Secretary; Mr. H. Holz, Foreman; Mr. J. McKee, Foreman in Charge of Greenhouses; Mr. H. J. Read, in Charge of Records; Mr. W. T. Ellis, Assisting with Records; Mr. John Melvin and Mr. Howard Russell, Assisting at special work among the fruits and vegetables; Mr. J. Taggart and Mr. F. Taggart, Foremen on Ornamental Grounds; Mr. Geo. Perrin, Assistant Foreman in the Greenhouses; Mr. G. E. Bass and Miss Muriel Hervey, Stenographers. It is desired to make especial mention of the services of Mr. M. B. Davis, B.S.A., who in addition to his work with fruit, in the absence of Mr. C. F. W. Dreher at the front took personal supervision of the vegetable experiments and prepared the report on the results of the experiments for the year, so relieving me of the details of this work. I have much pleasure, also, in acknowledging the services of those other men in the Horticultural Division who, though they may not be given any responsibility, yet contribute their share to the success of the work.

I also desire to express my appreciation of the co-operation which the Superintendents of the Branch Farms and Stations give in the Horticultural work and of their kind hospitality shown to me when making my visits to the farms of which they have charge. To many other men in Canada and the United States who have been good enough to assist me in giving information desired my thanks are also due.

I have the honour to be, sir,

Your obedient servant.

W. T. MACOUN,
Dominion Horticulturist.

CENTRAL EXPERIMENTAL FARM, OTTAWA, ONT.

CHARACTER OF SEASON.

Every year, since 1898, there has been published in the Annual Report of the Horticultural Division a chapter on the character of the season, especially in its relation to horticultural crops. This is very useful for reference for prospective fruit and vegetable growers and for those already growing these crops. Those growing ornamental plants are also interested in these records.

There was an early spring in 1915, the ground being free enough of frost to permit digging on April 5, the average for eighteen years being April 11.

Owing to the light snowfall the strawberries were more exposed to the changes of temperature than usual and the plantation suffered considerably.

The tenderer roses were badly injured by winter for the same reason. Evergreens suffered considerably, several trees of the balsam fir, both on the Experimental Farm and the driveway, dying or being killed to near the ground. Hovey's arbor-vitæ has suffered more than other varieties, though the pyramidal arbor-vitæ had branches killed on the south side of some specimens. Except for the first week, April was a moderately warm month. The temperature rose to 87·3° Fahr. on the 25th. The lowest temperature was 25° Fahr. on the 4th. It was a relatively dry month, there being only 0·99 inch of precipitation.

May was a moderately warm to rather cool month. The highest temperature was 78·6° Fahr. on the 31st. It was below freezing twice during the month: on the 16th, when it was 31·8°, and on the 27th, when it was 31·9°, the last spring frost. This latter frost injured plum and cherry blossoms, the fruit being just setting, and also the flowers of strawberries. This frost was much more severe in parts of Ontario farther south and west than it was at Ottawa. May was a very dry month, there being 1·86 inches of rain, which fell mainly as light showers.

By June 8 the grass of the lawns was showing the effects of the drought, but on the 14th and the 15th there were good rains, nearly half the total precipitation of 2·94 inches being on these dates. Cut-worms were particularly troublesome during the latter part of May and early half of June. The highest temperature was 90·1° on the 5th, but there was little hot weather during the month.

The highest temperature of the summer occurred on July 31, when it was 92°, and while the hottest spell of the month was from the 9th to the 16th, July was not a hot month on the whole, and the nights were cool. The rainfall was light, there being only 2·12 inches.

August was only a moderately warm month and the nights were cool. The highest temperature was 86° on the 11th. This was the wettest month of the growing season, there being 7·09 inches of rain, which fell on seventeen days.

September was moderately warm also. The highest temperature was 88·7° on th 15th, and the lowest 35° on the 28th and 30th. There were frequent showers during the month, but no very heavy rain at one time. The total precipitation was 2·87 inches.

October was moderately warm to cool, the highest temperature being 72·4° on the 13th. The first recorded frost was on the 11th, when the temperature fell to 27·8°. Up to that time such tender things as squash and tomatoes on high ground had not been killed, though light frost not recorded by the official thermometer had injured these to some extent previously on the lower ground. Practically all annual flowers had been uninjured up to this date and there was still considerable bloom on October

25, when a temperature of 26·6° killed most of the remaining flowers. The weather was fine most of the time in October, there being only 1·30 inches of rain, making conditions favourable for a ripening up of the fruit trees. The autumn was rather cool, however, for the ripening of the grape crop, few varieties being thoroughly matured.

The highest temperature in November was 60·8° on the 1st, and the lowest 14° on the 18th. It became mild during the latter part of the month and winter did not really set in until December 2, when snow began to fall on the unfrozen ground and the temperature becoming lower, this remained. The average date for eighteen years when winter has set in, or when frost or snow stopped ploughing, is November 25.

December was comparatively mild for the season of the year. The lowest temperature was 8·2° below zero on the 31st, and it was only twice below zero during the month and above freezing on seven days, the weather being very changeable. There was a heavy snowfall in December.

January was a moderately cold month with very changeable weather. Although the temperature was below zero on nine days, the lowest was only 16° below. The temperature was above freezing on 12 days, the highest temperature being 42° on the 22nd. There was a thick coat of ice over the snow during the latter part of January.

February was only moderately cold and the weather not so changeable as in January, the lowest temperature being 19·4° below zero on the 21st, which was the lowest temperature of the winter. It was below zero on thirteen days during the month. The temperature rose above freezing on four days. There were frequent snowfalls in February.

March was a rather cold month for the time of the year. The temperature was 17·2° below zero on the 18th, and fourteen times below during the month. It began to thaw on the 24th, at which time there was a great depth of snow. The precipitation of snow was 130 inches during the winter, one of the heaviest on record. Owing to this great covering there was little frost in the ground.

FRUIT AND VEGETABLE CROPS.

The fruit crop on the whole was a disappointing one to Canadian growers in 1915. Spring frosts in some parts of Canada and Apple Scab in others caused a marked reduction in the amount of good apples promised by the abundant bloom when the flowers opened. In Ontario the apple crop was light to medium and the fruit much scabbed in some sections. In Quebec and New Brunswick the crop was light, and on Prince Edward Island, medium. In the Annapolis Valley of Nova Scotia there was a medium crop of fruit of which the proportion of No. 1 fruit was relatively small because of the scab. In British Columbia the crop was a medium one, but a late development of scab in some districts lowered the quality very much. There was a fair crop of apples in Southern Manitoba and Southern Alberta on the trees which are being grown there. The crop of pears was light to medium in those parts of Canada where pears are grown. The plum crop was a good one on the whole. Cherries were a medium to good crop. In some parts of Ontario the yield was reduced by spring frosts. There was a good crop of peaches both in Ontario and British Columbia. The crop of grapes in Ontario was only a medium one, and the fruit did not ripen as well as usual owing to the cool autumn.

The strawberry crop was reduced by spring frosts in Ontario and Quebec, and it was only a light to medium crop, except in a few favoured sections. In the Maritime Provinces the crop was good, and in British Columbia it was medium to good. The crop of currants was lessened considerably in Ontario by spring frosts, but taking the whole of Canada the crop of these, and raspberries and gooseberries, was good. Small fruits are being much more grown in the prairie provinces than formerly, and there was a good crop this year.

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The conditions for vegetables in general were not very favourable, as droughts at one season and excessive moisture at another were hard on some crops. In Eastern Canada the summer was cool and wet, and the potato crop suffered from late blight, while the tomato crop was below medium as the conditions were unfavourable for ripening. In the Prairie Provinces and in British Columbia the potato crop was much better than in most places in Eastern Canada.

At the Central Farm the crop of apples was a medium one and the fruit very free of scab and codling moth. Thorough spraying for nearly twenty-five years has made it much easier to control certain insects and diseases than where spraying is not done regularly. Owing to spring frosts the plum crop was a medium to light one, and the crop of cherries was light as usual. Bush fruits and strawberries were medium. Grapes did not ripen well owing to the cool autumn. The spring being very dry, the season opened unfavourably for vegetables, but as there was sufficient rain after the middle of June for the hardier vegetables, these did very well. The vegetables such as tomatoes, cucumbers, melons, peppers and other crops needing warmer weather than was experienced in the latter part of summer did not ripen as large a crop as usual. The potatoes in the experimental plots gave a fair yield and, owing to thorough spraying, there was little late blight.

SEEDLING FRUITS SENT FOR EXAMINATION, 1915-16.

As in other years a number of seedling fruits from different parts of Canada were sent to the Horticultural Division for examination. It is customary to make a full description of the most promising or interesting of these, and a record and partial description of the others. Following is a list of those received during 1915-16:—

Record Number—

636	seedling apple	from Percy Robertson, Montague, P.E.I.
637-638	"	Earnest Eaton, Upper Canard, N.S.
639	"	No. 1 "Roberts Beauty" from H. W. Roberts, Clarendon Station, N.B.
640	"	from Jack & Sons, Chateauguay Basin, Que. (See full description.)
641	"	Alfred Picard, Village des Aulnaies, Que. (See full description.)
642	"	W. E. Jones, West Shefford, Que.
643	"	John Butcher, Peterboro, Ont. (See full description.)
644	"	W. Roger, Aylmer, Que. (See full description.)
645	"	J. Antin, Brockville, Ont.
646	"	Jas. Crawford, Williamstown, Ont.
647-649	"	Mrs. F. H. McRae, Beaverton, Ont.
650	"	A. Munn & Sons, Ripley, Ont. (Seedless Apple.) (See full description.)
651-653	"	C. L. Stephens, Orillia, Ont.
654-655	"	Valley River Nursery, Valley River, Man.
656	"	Goodacre & Browse, Wilson Landing, B.C. (See full description.)

640. *Seedling apple from R. Jack & Sons, Chateauguay Basin, Que.*—Medium size; roundish, slightly ribbed; cavity open, medium depth; stem medium length, moderately stout; basin open, medium depth, slightly wrinkled; calyx partly open or closed; pale yellowish green almost covered with deep crimson; seeds medium size, broad, acute; dots moderately numerous, white, distinct; bloom bluish; skin moderately thick, moderately tender; flesh white with traces of red, has a slight Fameuse-like aroma, crisp, juicy; core medium; flavour mildly subacid, pleasant, suggesting Fameuse; quality good; season evidently October to December or January.

"Fruited for first time this year. Think it is a seedling of McIntosh crossed with Fameuse which is very near, or else it is a seedling of Fameuse. No special care. Grew up along a fence line. Tree is of upright growth and seems to be quite hardy. It bore about half a bushel this year." Resembles Fameuse considerably in colour and general outward appearance and slightly like Fameuse in flavour. It is not quite decided enough in flavour to be very promising, but is worth looking after.

641. *Seedling from Alfred Picard, Village des Aulnaies, Que.*—Medium size; roundish, regular; cavity narrow, medium depth; stem short, moderately stout; basin

open, medium depth, wrinkled; calyx partly open; pale yellow, thinly washed with carmine on sunny side; seeds large, acuminate; dots obscure; skin moderately thick, tender; flesh white, tender, juicy; core medium; flavour subacid, pleasant; quality evidently good though past condition; season evidently early to mid winter.

Has a perfume. Probably a seedling grown in uncultivated ground.

643. *Seedling apple from John Butcher, 301 Burnham street, Peterboro, Ont.*—Large size; oblate conic; cavity deep, open; stem short, moderately stout; basin deep, medium width; calyx closed; pale greenish yellow thinly washed with pinkish red on sunny side; seeds large, acute; dots few, indistinct; skin moderately thick, tender; flesh dull white or yellowish, crisp, juicy; core medium; flavour subacid, pleasant; quality good; season evidently October and November.

Flesh is too coarse for a good dessert apple and not sufficiently attractive in appearance. Should make a good cooker.

644. *Seedling apple from W. Roger, Registration Branch, Department of Interior, Ottawa, Ont. (grown at Aylmer, Que.).*—Large size; oblate to roundish; cavity deep, open; stem medium length, moderately stout; basin deep, open, slightly wrinkled; calyx open; yellow, washed, splashed and striped with carmine; seeds medium size, acute; dots few, white, distinct; skin moderately thick, tender; flesh white with traces of red; core medium; flavour subacid, pleasant; quality good; season evidently November to January.

Probably a seedling of St. Lawrence. Second crop. Probably seven years old. May prove a useful apple.

650. *Seedling apple from A. Munn & Sons, Ripley, Ont.*—Medium size; roundish, ribbed; cavity shallow, medium width; stem short, moderately stout; basin medium depth and width, wrinkled; calyx open or partly open; pale yellowish green washed with pinkish red on sunny side; seedless; dots few, indistinct; skin moderately thick, moderately tough; flesh white, tender, juicy; core large, open; acid, little flavour; quality medium; season October.

A seedless apple but not promising.

656. *Seedling apple from Goodacre & Browse, Wilson Landing, Okanagan Landing, B.C.*—Above medium in size; roundish, obtusely conical; cavity medium depth and width; stem short, stout; basin deep, open, nearly smooth; calyx partly open; yellow, washed and splashed with crimson or orange red; seeds medium size, acute; dots moderately numerous, yellow, distinct; skin moderately thick, tender; flesh yellowish, firm, moderately juicy, rather coarse; core small; flavour subacid, to mildly subacid, pleasant; quality good; season evidently late November, probably to January or February.

Said to be a seedling of Wealthy. An attractive looking apple resembling Sutton Beauty considerably. Promising. Should ship well.

APPLES ORIGINATED IN THE HORTICULTURAL DIVISION.

There is an increasing number of apple trees beginning to fruit each year of which both parents are known or, in other words, which were originated by hand pollination, but there are no new ones which have been thought worthy of a name this year. On the other hand there are three seedlings of which only one parent is known which have been named and descriptions of these follow. One cross-bred apple originated by the late Dr. Wm. Saunders has been named during the past year and a description of it will be found after the other three. Following these descriptions is a list of names of varieties of apples originated in the Horticultural Division, 118 in all, with references as to the time of sowing the seed, planting in the orchard, first fruiting and time and

place where the descriptions occur in the annual report. There are not included, in this, the names of apples originated by the late Dr. Wm. Saunders, as they were originated outside the Horticultural Division, but a full list of such names will be published in a subsequent report.

Beda (*Langford Beauty Seedling*).—Size medium, oblate to roundish; cavity medium depth and width; stem medium length, stout; basin deep, open, wrinkled; calyx open; pale yellow thinly splashed and washed with bright carmine; seeds obtuse or acute; dots obscure; skin moderately thick, moderately tough; flesh yellowish, crisp, tender, juicy; core medium size, open; flavour subacid, pleasant; quality good; season late September and October.

Does not resemble Langford Beauty except in having tender, fine grained flesh.

Girton (*Wealthy Seedling*).—Size above medium to medium; roundish conical, slightly ribbed; cavity narrow, deep, russeted; stem short, slender to moderately stout; basin deep, medium width; calyx open; greenish yellow to yellow, thinly washed with crimson; dots white, indistinct; skin moderately thick, tough; flesh dull white or yellowish, crisp, tender; core small, open; flavour subacid, pleasant, spicy; quality good; season November to late February or March.

Resembles Wealthy somewhat in outward appearance and in character of flesh.

Honora (*McIntosh Seedling*).—Size medium; roundish to oblate conic; cavity open, medium depth, russeted; stem short, stout, sometimes clubbed; basin medium depth and width, wrinkled; calyx closed; yellow well washed with crimson; seeds medium size, acuminate; dots obscure; skin moderately thick, tough; flesh white tinged with red, tender, melting, moderately juicy; core medium size, open; flavour mildly subacid, pleasant; quality good; season late September, probably through October.

Resembles McIntosh very much in colour and somewhat in shape, also in character of flesh and in being highly perfumed like McIntosh. Attractive in appearance.

Piotosh (*Pioneer X McIntosh*).—Size above medium for a crab; roundish; cavity medium depth and width; stem long, moderately stout; basin open, medium depth, wrinkled; calyx closed; yellow well washed with bright crimson; seeds below medium for apple, large for a crab, acute; dots obscure; bloom pinkish; skin thin, tender; flesh yellow tinged with red near skin; core medium; flavour subacid, pleasant, no astringency; quality good for a crab; season late September.

A handsome crab apple somewhat resembling Transcendent. No marked resemblance to McIntosh.

NAMES GIVEN TO APPLES ORIGINATED IN THE HORTICULTURAL DIVISION, CENTRAL EXPERIMENTAL FARM, OTTAWA, UP TO MARCH 31, 1916.

Seedling Varieties.	Female Parent	Date of Sowing seed.	Date of Planting tree.	Date of first fruiting.	Fruit described.
Ascot	Northern Spy	Autumn, 1898.	Spring, 1903..	1912 R.	1913, P. 292.
Bingo	"	"	" 1902..	1910 R.	1911, P. 110.
Donald	"	"	" 1902..	1909 R.	1912, P. 92.
Elmer	"	"	" 1902..	1911 R.	1912, P. 92.
Emilia	"	"	" 1902..	1914 R.	1915, P. 595.
Epsom	"	"	" 1902..	1912 R.	1913, P. 293.
Galton	"	"	" 1906..	1912 R.	1915, P. 595.
Glenton	"	"	" 1902..	1909 R.	1911, P. 111.
Homer	"	"	" 1902	1908 R.	1910, P. 135.
Lipton	"	"	" 1904..	1914 R.	1915, P. 595.
Marcus	"	"	" 1902..	1911 R.	1912, P. 93.
Nestor	"	"	" 1902	1912 R.	1912, P. 93.
Niobe	"	"	" 1902	1909 R.	1911, P. 111.
Rocket	"	"	" 1902..	1910 R.	1911, P. 112.
Rosalie	"	"	" 1901..	1908 R.	1911, P. 112.
Sandow	"	"	" 1902..	1911 R.	1912, P. 94.
Sparta	"	"	" 1901..	1912 R.	1914, P. 495.
Marne	"	"	" 1903..	1913 R.	1915, P. 595.
Orlando	"	"	" 1902	1911 R.	1913, P. 294.
Pandora	"	"	" 1902..	1908 R.	1913, P. 294.
Tasty	"	"	" 1902..	1911 R.	1912, P. 94.
Thurso	"	"	" 1901..	1907 R.	1908, P. 103.
22 varieties.					
Beda	Langford Beauty	"	" 1902..	1910 R.	1916, P. 617.
Brisco	"	"	" 1903..	1910 R.	1913, P. 292.
Cora	"	"	" 1902..	1907 R.	1911, P. 110.
Diana	"	"	" 1903..	1912 R.	1913, P. 292.
Diacet	"	"	" 1903..	1911 R.	1914, P. 494.
Gulena	"	"	" 1903..	1911 R.	1913, P. 293.
Galner	"	"	" 1902..	1907 R.	1908, P. 101.
Garald	"	"	" 1903..	1911 R.	1912, P. 92.
Herace	"	"	" 1902	1908 R.	1912, P. 93.
Kordare	"	"	" 1902	1908 R.	1911, P. 111.
Kilm	"	"	" 1902	1908 R.	1911, P. 111.
Liinda	"	"	" 1902	1908 R.	1915, P. 595.
Moreno	"	"	" 1902	1908 R.	1913, P. 293.
Monitor	"	"	" 1903	1909 R.	1912, P. 93.
Ripon	"	"	" 1902...	1908 R.	1911, P. 111.
Sonora	"	"	" 1902	1907 R.	1908, P. 102.
16 varieties.					
Brock	McIntosh	"	" 1901..	1908 R.	1910, P. 134.
Carno	"	"	" 1901..	1907 R.	1911, P. 110.
Caruso	"	"	" 1903..	1909 R.	1912, P. 91.
Casco	"	"	" 1903	1913 R.	1914, P. 494.
Garnet	"	"	" 1901..	1908 R.	1912, P. 92.
Gilda	"	"	" 1904	1909 R.	1914, P. 494.
Grover	"	"	" 1901	1908 R.	1913, P. 293.
Honora	"	"	" 1901	1908 R.	1916, P. 617.
Lobo	"	"	" 1901..	1906 R.	1910, P. 135.
Forerunner	"	"	" 1904	1910 R.	1915, P. 595.
Melba	"	"	" 1901..	1908 R.	1909, P. 111.
Nemo	"	"	" 1901..	1908 R.	1912, P. 93.
Joyce	"	"	" 1901..	1911 R.	1912, P. 93.
Pedro	"	"	" 1903..	1911 R.	1913, P. 294.
Service	"	"	" 1901..	1908 R.	1912, P. 94.
Seton	"	"	" 1901..	1908 R.	1911, P. 112.
Toshlet	"	"	" 1901..	1912 R.	1914, P. 495.
Valerie	"	"	" 1903..	1908 R.	1914, P. 495.
Winton	"	"	" 1901..	1908 R.	1915, P. 596.
19 varieties.					
Humber	American Golden Russet....	"	" 1902..	1911 R.	1913, P. 293.
1 variety.					

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NAMES GIVEN TO APPLES ORIGINATED IN THE HORTICULTURAL DIVISION, CENTRAL EXPERIMENTAL FARM, OTTAWA, UP TO MARCH 31, 1916.—*Continued.*

Seedling Varieties.	Female Parent.	Date of Sowing seed.	Date of Planting tree.	Date of first fruiting.	Fruit described.
Lucia	Salome	Autumn, 1898.	Spring, 1902	1912 R.	1914, P. 494.
Cleaver	"	"	" 1902	1910 R.	1912, P. 92.
Manda	"	"	" 1902	1910 R.	1913, P. 293.
Nepean	"	"	" 1902	1908 R.	1910, P. 135.
Oswald	"	"	" 1902	1908 R.	1910, P. 136.
Rondo	"	"	" 1902	1911 R.	1912, P. 94.
Rouleau	"	"	" 1902	1907 R.	1910, P. 136.
Stella	"	"	" 1902	1908 R.	1910, P. 136.
8 varieties.					
Petrel	Shiawassee	"	" 1901	1907 R.	1910, P. 136.
Ramona	"	"	" 1902	1908 R.	1913, P. 294.
2 varieties.					
Albert	Winter St. Lawrence	"	" 1901	1909 R.	1912, P. 91.
Anson	"	"	" 1901	1909 R.	1910, P. 134.
Atlas	"	"	" 1902	1910 R.	1912, P. 91.
Drumbo	"	"	" 1902	1910 R.	1915, P. 594.
Linton	"	"	" 1901	1907 R.	1908, P. 102.
Nile	"	"	" 1902	1908 R.	1912, P. 94.
6 varieties.					
Adonis	Wealthy	"	" 1901	1905 R.	1905, P. 107.
Battle	"	"	" 1901	1906 R.	1910, P. 134.
Clive	"	"	" 1902	1907 R.	1908, P. 101.
Consort	"	"	" 1901	1908 R.	1914, P. 494.
Crusoe	"	"	" 1901	1903 R.	1906, P. 107.
Galetta	"	"	" 1902	1906 R.	1906, P. 108.
Girton	"	"	 1901	1908 R.	1916, P. 617.
Jethro	"	"	" 1902	1911 R.	1914, P. 494.
Luke	"	"	" 1902	1906 R.	1911, P. 111.
Medford	"	"	" 1901	1906 R.	1908, P. 102.
Melvin	"	"	" 1901	1905 R.	1910, P. 135.
Mendel	"	"	" 1902	1906 R.	1906, P. 108.
Pinto	"	"	" 1902	1906 R.	1909, P. 111.
Prosper	"	"	" 1902	1908 R.	1910, P. 136.
Noel	"	"	" 1901	1905 R.	1906, P. 108.
15 varieties.					
Roger	Gano	"	" 1902	1908 R.	1911, P. 112.
1 variety.					
Cobalt	Lawyer	"	" 1902	1908 R.	1910, P. 134.
Congo	"	"	" 1901	1906 R.	1906, P. 107.
Danville	"	"	" 1902	1908 R.	1909, P. 111.
3 varieties.					
Herald	Fameuse	"	" 1902	1902 R.	1910, P. 135.
1 variety.					
Ambo	Swayzie	"	" 1904	1912 R.	1914, P. 493.
Cromer	"	"	" 1902	1905 R.	1909, P. 111.
Navan	"	"	" 1902	1906 R.	1906, P. 108.
Nome	"	"	" 1904	1909 R.	1915, P. 596.
Ottawa	"	"	" 1902	1906 R.	1906, P. 108.
Radnor	"	"	" 1902	1907 R.	1909, P. 111.
Severn	"	"	" 1901	1906 R.	1908, P. 102.
7 varieties.					
Bruno	Scott Winter	"	" 1901	1907 R.	1908, P. 101.
1 variety.					
Claire	Russian	Autumn, 1889.	" 1890	1906 R.	1906, P. 107.
Neville	"	" 1889.	" 1890	1904 R.	1906, P. 108.
Oscar	"	" 1889.	" 1890	1897 R.	1908, P. 102.
Rupert	"	" 1889.	" 1890	1897 R.	1906, P. 109.
Percival	"	" 1889.	" 1890	1906 R.	1906, P. 108.
5 varieties.					

NAMES GIVEN TO APPLES ORIGINATED IN THE HORTICULTURAL DIVISION, CENTRAL EXPERIMENTAL FARM, OTTAWA, UP TO MARCH 31, 1916.—*Concluded.*

Seedling Varieties.	Female Parent.	Date of Sowing seed.	Date of Planting tree.	Date of first fruiting.	Fruit described.
Cross-bred Varieties.					
Rustler	McIntosh X Lawver	Autumn, 1899.	Spring, 1903.	1912 R.	1913, P. 294.
Mavis	"	" 1899.	" 1903.	1909 R.	1915, P. 599.
Vermac	Lawver X McIntosh	" 1899.	" 1902.	1908 R.	1913, P. 295.
Holz	"	" 1899.	" 1903.	1911 R.	1912, P. 92.
Granby	McMahan X Scott Winter	" 1895.	" 1896.	1907 R.	1908, P. 101.
Kelso	"	" 1895.	" 1896.	1907 R.	1908, P. 102.
Sorel	"	" 1895.	" 1896.	1907 R.	1908, P. 102.
Dorval	"	" 1895.	" 1896.	1905 R.	1906, P. 107.
Roberval	"	" 1895.	" 1896.	1905 R.	1906, P. 108.
Valois	"	" 1895.	" 1896.	1905 R.	1906, P. 109.
Walton	"	" 1895.	" 1896.	1903 R.	1906, P. 109.
11 varieties.					
Total, 118 varieties.					

The following names recorded first in the Annual Report of the Experimental Farms for 1906 were given to seedling varieties of Russian origin, descriptions of which have not yet been published. These were among the best and apparently the hardiest of 3,000 trees. They have been sent to the prairie provinces for trial and should any of them prove promising descriptions will appear in the annual reports. Arcola, Birtle, Bowie, Bolton, Beaver, Bomba, Bison, Carlyle, Carman, Cicero, Cecil, Carrie, Crescent, Cottage, Dauphin, Dewar, Earliana, Grenfell, Hanley, Hamlet, Harbinger, Jarvis, Jasper, Jacko, Lang, Leroy, Mentor, Melfort, Morden, Murillo, Morley, Nipigon, Osler, Otter, Pingree, Ponoka, Parma, Polaris, Roslin, Rawdon, Selkirk, Snelling, Solina, Sorley, Sanford, Souris, Selwyn, Vesta, Virgil, Varna, Virden, Woburn and Wesley—53 varieties.

CHARACTERS OF SEEDLING APPLES ORIGINATED IN THE HORTICULTURAL DIVISION.

As descriptions are taken of the seedling apples which are originated in the Horticultural Division whether they are large or small or good, medium, or poor in quality, it is possible to tell after a time what parents are giving the largest proportion of good seedlings and which the smallest. In the following table certain characters of 1211 seedlings from twelve varieties are given in such a form that they can be easily compared. These seedlings were raised from seed saved from apples which fruited at Ottawa in 1898. The flowers were not hand-pollinated and the male parents can only be suggested by the characters of the seedlings and the varieties which grew nearest to the tree from which the seed was taken, and of which there is a record. While the male parent is thus not known with certainty, a study of the following table will be found very interesting. The characters of the seedlings of a few of these varieties have been published in previous annual reports, but more trees of these have fruited since. The descriptions were all made by the writer, hence the same relative values are more likely to be given to the characters of the different seedlings than if several persons, having different standards, had described them. The notes and figures under *Resemblance* do not apply to all the seedlings described. If a character of a female parent was conspicuous in the seedling it was noted but, no doubt, there were many slight resemblances which were not noted, hence the percentages after the various headings under *Resemblance* are merely suggestive; but all the other characters were recorded for all the seedlings.

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The following characters of the seedlings of the varieties are quite marked.

Fameuse Seedlings.—It is generally supposed that seedlings of Fameuse resemble the female parent in a marked degree. In this case the number of good Fameuse seedlings has been small, while a large proportion of the seedlings of McIntosh, which is supposed to be a seedling of Fameuse, have been good.

Gano Seedlings.—A large proportion of the seedlings resemble the female parent in regularity of form, in colour, in absence of flavour, and in having large seeds. A large proportion of the seedlings are winter apples like the female parent.

American Golden Russet Seedlings.—It is interesting to note that of 28 seedlings which have fruited none has a russet skin. In 78·58 per cent green or yellow predominates. A comparatively small proportion have been propagated and only one has been thought good enough to name.

Langford Beauty Seedlings.—A large proportion are handsome, fine-grained apples of the Fameuse type with a marked resemblance to the female parent or to Louise, a seedling of Fameuse.

Lawver Seedlings.—While twenty-nine per cent of the seedlings are late-keeping apples like the female parent, it is interesting to note that a large proportion have a season before December. Some of the Lawver seedlings show marked signs of Northern Spy blood, particularly in character of flesh and flavour. Both Lawver and Northern Spy are late-blooming sorts and were not very far apart in the orchard in 1898.

McIntosh Seedlings.—The McIntosh is supposed to be a seedling of Fameuse and has many Fameuse characteristics. Its seedlings have been much better than the Fameuse seedlings, nearly one-half the McIntosh seedlings being thought worthy of propagation, while less than a fourth of the Fameuse seedlings were propagated.

Northern Spy Seedlings.—Though, at least, partially self-sterile, and thus doubtless pollenized by some other variety or varieties, there has been a marked resemblance to the Northern Spy in a large proportion of the seedlings in outward appearance, flesh, and flavour, and in being late-keeping apples.

Salome Seedling.—The Salome has given some good seedlings, though the best are not from this variety. A large proportion of the seedlings bore a marked resemblance to Salome in outward appearance, flesh and flavour.

Shiawassee Seedlings.—The Shiawassee is a seedling of Fameuse. A large proportion of its seedlings had fine grained, tender flesh and were above medium to good in quality, but the percentage thought worth propagating was only a little larger than the Fameuse seedlings.

Swayzie Seedlings.—Only a small proportion of the seedlings resemble the parent in outward appearance, though a large percentage bear a marked resemblance to Swayzie in flavour. The Swayzie is a small apple, but of the seedlings, over 78 per cent were medium to large.

Wealthy Seedlings.—There is a general resemblance to Wealthy in a large proportion of the seedlings, particularly in colour and the regular outline of the fruit and character of flesh and flavour.

Winter St. Lawrence Seedlings.—The Winter St. Lawrence has given a large proportion of seedlings above medium to good in quality, but the proportion thought worthy of propagation is about the same as for Fameuse. There are few late keeping apples among them.

In describing the apples of which the characteristics are given in the following table, the standards adopted for size were as follows:—

Small—$2\frac{1}{4}$ inches in diameter, and below.
Below medium—$2\frac{1}{4}$ to $2\frac{1}{2}$ inches in diameter.
Medium—$2\frac{1}{2}$ to $2\frac{3}{4}$ inches in diameter.
Above medium—$2\frac{3}{4}$ to 3 inches in diameter.
Large—3 to $3\frac{1}{2}$ inches in diameter.
Very large—Above $3\frac{1}{2}$ inches in diameter.

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	Character of female Parent.	Famense Seedlings.	Character of female Parent.	Gano Seedlings.	Character of female Parent.	American Golden Russet Seedlings.	Character of female Parent.	Langford Beauty Seedlings.	Character of female Parent.	Lawyer Seedlings.	Character of female Parent	McIntosh Seedlings.	Character of female Parent.	Northern Spy Seedlings.	Character of female Parent.	Salome Seedlings.	Character of female Parent	Shiawassee Seedlings.	Character of female Parent.	Swayzie Seedlings.	Character of female Parent.	Wealthy Seedlings.	Character of female Parent.	Winter St. Lawrence Seedlings.
No. Seedlings Fruited		91		83		28		140		62		120		136		108		99		130		136		78
No. Seedlings Propagated		21		10		4		61		15		56		63		23		26		36		44		19
No. Seedlings Named		1		1		1		16		3		19		22		9		2		7		15		6
Size—		%		%		%		%		%		%		%		%		%		%		%		%
Small		6·59		6·02		0·00		0·00		6·45		5·00		2·21		2·78		3·08	x	5·39		7·35		2·57
Below medium		15·39		12·05		10·71		5·00		11·29		18·33		10·29		16·67		11·11		16·15		13·24		12·82
Medium	x	58·24		40·96	x	42·86	x	54·29	x	62·90		50·84	x	47·06	x	50·00		58·59		43·85		43·39		57·69
Above medium		17·59	x	38·56		35·72	x	35·00		19·36	x	23·33		30·15		22·22	x	26·26	x	26·15		29·41	x	19·23
Large		2·19		2·41		10·71		5·71		0·00		2·50	x	10·29		8·33		5·05		8·46		6·61		7·69
Total		100·00		100·00		100·00		100·00		100·00		100·00		100·00		100·00		100·00		100·00		100·00		100·00
Form—																								
Oblate		30·77		13·25		32·14		35·00		35·48		46·67		37·50	x	18·52	x	66·67	x	40·00		33·09		14·10
Roundish	x	53·85		38·56	x	57·15	x	53·57	x	38·71	x	48·33	x	36·03	x	67·59		31·31		53·08	x	61·03	x	79·48
Conical		13·19		43·37		0·00		11·43		16·13		3·33		26·47		3·70		2·02		3·84		2·94		6·42
Oblong		2·19		4·82		10·71		0·00		9·68		1·67		0·00		10·19		0·00		3·08		2·94		0·00
Total		100·00		100·00		100·00		100·00		100·00		100·00		100·00		100·00		100·00		100·00		100·00		100·00
Colour—																								
Entirely Green or Yellow		2·19		0·00		3·57		2·14		0·00		0·83		1·47		0·00		5·05		4·61		0·00		0·00
Green or Yellow Predominating		16·49		25·30		78·58		17·14		12·90	x	24·16		8·09		5·56		29·29		40·77		5·15		15·38
Crimson or Red	x	60·44	x	67·47		3·57	x	76·43	x	58·06	x	65·83	x	72·79		44·44	x	59·60		23·85	x	73·53	x	66·67
Pink or pinkish red		14·29		0·00		3·57		0·72		8·07		5·00		2·21		7·41		1·01		0·77		0·73		1·28
Orange or orange red		6·59		7·23		10·71		3·57		20·97		4·18		15·44	x	42·59		5·05		23·08		20·59		16·67
Russet		0·00		0·00		0·00		0·00		0·00		0·00		0·00		0·00	x	0·00	x	6·92		0·00		0·00
Total		100·00		100·00		100·00		100·00		100·00		100·00		100·00		100·00		100·00		100·00		100·00		100·00

Flavour—																														
Sweet		16·49		9·64		0·00		3·57		16·13		19·16		6·62		17·59		2·02		10·77		13·97		16·67						
Mildly subacid		6·59	x	16·87		3·57		5·00		11·29		4·18		5·15		11·11		2·02		7·69		0·73		5·12						
Subacid	x	56·04		56·62	x	75·00	x	60·71		59·68	x	60·00	x	60·29	x	46·30	x	65·66	x	53·08		38·97	x	56·41						
Briskly subacid		18·69		16·87		21·43		29·29	x	11·29		15·83		25·00		22·22		26·26		24·62	x	36·77		19·23						
Acid		2·19		0·00		0·00		1·43		1·61		0·83		2·94		2·78		4·04		3·84		9·56		2·57						
Total		100·00		100·00		100·00		100·00		100·00		100·00		100·00		100·00		100·00		100·00		100·00		100·00						
Quality—																														
Poor		0·00		0·00		0·00		0·00		0·00		0·00		0·00		0·00		0·00		0·00		0·73		0·00						
Below medium		1·10		1·20		0·00		0·00		0·00		0·00		0·00		0·00		2·02		0·00		2·21		1·28						
Medium		27·47	x	67·47		57·15		15·71		40·32		11·66		23·53		41·67		18·18		23·85		27·94		24·36						
Above medium		50·55		31·33		35·71		49·29	x	41·94		41·67		50·00		40·74		47·48		47·69		50·74		48·72						
Good to very good	x	20·88		0·00	x	7·14	x	35·00		17·74	x	46·67	x	26·47	x	17·59	x	32·32	x	28·46	x	18·38	x	25·64						
Total		100·00		100·00		100·00		100·00		100·00		100·00		100·00		100·00		100·00		100·00		100·00		100·00						
Season—																														
August-mid-September		10·99		0·00		0·00	x	16·43		6·45		1·67		0·74		8·33		20·21		5·39		26·47		26·92						
Mid-September to Mid-October		21·98		10·84		7·14		27·86		12·90		18·33		14·70		19·45		24·24		6·15		16·18		15·38						
October-November	x	31·87		14·46		28·58		29·29		22·59		28·33		38·23		20·37		24·24		30·77	x	36·77		19·23						
November-February		29·67		25·30		32·14		20·71		29·03	x	34·17		27·21		26·85	x	18·18	x	30·00		11·76	x	34·62						
December-April		5·49	x	49·40	x	32·14		5·71	x	29·03		17·50	x	19·12	x	25·00		13·13		27·69		8·82		3·85						
Total		100·00		100·00		100·00		100·00		100·00		100·00		100·00		100·00		100·00		100·00		100·00		100·00						
Resemblance—																														
In outward appearance		19·78		21·69		10·71		22·86		12·90		15·83		25·00		25·00		13·13		3·08		41·18		19·23						
In flesh		36·26		56·62		21·43		47·14		20·97		18·23		40·44		71·30		52·53		23·85		46·32		29·49						
In flavour		34·07		48·19		35·71		26·43				25·00		34·57		36·11		32·32		37·69		19·12		28·21						
No resemblance		38·46		4·82		32·14		30·00		35·48		28·33		27·94		14·81		32·32		40·77		27·94		28·21						
In whiteness of flesh only		5·49						1·43										5·05												
In form and not colour		3·30		20·48		17·86		12·14		1·61		7·50		8·09		3·70		26·26		11·54		5·15		6·42						
In colour and not form		2·19		0·00		3·57		7·86				17·50		1·47		30·56		2·02		0·77		2·21		25·64						
In large seeds				66·27						46·77																				
In form only				2·41		10·71								2·94																
In colour				12·05						8·07				13·24																
In colour only				1·20						3·23				4·41																

POMOLOGY.

M. B. Davis, B.S.A., Assistant in Charge.

The past season could not be termed a very good one for fruit crops. Late spring frosts materially reduced the yields of strawberries and in many sections seriously affected the apple crop. The orchards at the Central Farm were not troubled to any great extent, but the crop of apples harvested was somewhat lighter than usual, especially of such varieties as McIntosh and Fameuse. This was, no doubt, due to the fact that the orchard bore heavily the previous season. The crop of currants, gooseberries and raspberries was good. Americana plums yielded an average crop. Nigra plums gave a very light crop and European varieties gave about an average yield. The Nigra plums, which bloom earlier than the others, were caught by spring frosts, which almost completely destroyed the crop. The crop of grapes was the largest yet taken from the new vineyard, which is just about sufficiently established to bear average crops.

Practically no winter injury to fruit trees, fruit bushes or strawberry plants was experienced, the winter of 1914-15 being exceptionally mild for this district. Cherries bloomed profusely and set good crops, a thing seldom experienced at Ottawa.

INDIVIDUALITY IN APPLE TREES OR BUD HEREDITY.

In the report of last year mention was made of the bud heredity test under way here. Three lots of trees are being used in this test, all of them being Wealthy apple trees, but propagated from different sources. One lot is the progeny of a heavy yielding Wealthy apple tree in the old close-planted Wealthy orchard, another lot is propagated from a poor yielding tree in the same orchard, while the third lot is propagated from a heavy and regular bearing tree in the old Wealthy orchard.

At the end of last season there appeared to be a result in total yield in favour of the trees propagated from the heaviest yielders. This year the yield from the progeny of the poorest yielder far exceeds the yield from either of the other lots. The total yield for the four years, however, is still in favour of the heaviest and most regular bearer, although the yield of the progeny of the heavy bearer is below that of the poorest yielder. The tabulated results of this experiment to date are given below:—

Progeny of the Heaviest Bearing Wealthy Tree.

Record No.	Tree.	Wealthy Bud Heredity Experiment.		Heaviest Yielder.		Total.
		1912.	1913.	1914.	1915.	
6320	3/1	0·25 gal.	0·0 gal.	4· gal.	0·50 gal.	.....
6321	3/2	0·0 "	0·0 "	7 "	1·25 "	.....
6322	3/3	0·0 "	0·0 "	4 "	0·50 "	.....
6323	3/4	0·0 "	0·0 "	4 "	0·25 "	.....
6324	3/5	0·50 "	2·75 "	8 "	0·00 "	.....
6491	13/3	0·50 "	1 apple.	7·5 "	0·75 "	.....
6475	12 4	1·0 "	·25 gal.	4·0 "	0·00 "	.....
Yearly totals	.....	2·25 gal.	3 gal.	38·5 gal.	3·25 gal.	47 gal.

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PROGENY of the Poorest Bearing Wealthy Tree.

Record No.	Tree.	Wealthy Bud Heredity Experiment.		Poorest Yielder.		Total.
		1912.	1913.	1914.	1915.	
6337	4/1	0 gal.	·75 gal.	3 gal.	1·5 gal.	.....
6338	4/2	0 "	0 "	5 "	·75 "	.....
6339	4/3	0 "	0 "	6 "	4·5 "	.....
6340	4/4	0 "	0 "	3 "	5· "	.....
6341	4/5	·5 "	·25 "	5 "	3·5 "	.....
6479	12/8	0 "	0 "	9 "	0 "	.....
6490	13/2	0 "	0 "	4 apples	0 "	.....
Yearly totals	.....	·5 gal.	1 gal.	31· gal.	15·25 gal.	47·75 gal.

PROGENY of the Heaviest and Most Regular Bearing Wealthy Tree.

Record No.	Tree.	Wealthy Bud Heredity Experiment.		Heaviest and Regular Bearer.		Total.
		1912.	1913.	1914.	1915.	
6354	5/1	2 apples.	3·25 gal.	3 gal.	1·75 gal.	.....
6355	5/2	3 "	2 apples.	7 "	3 apples.	
6356	5/3	0 "	0 "	3 "	1·75 gal.	.....
6357	5/4	0 "	0 "	3 "	0·50 "	.....
6358	5/5	0·5 gal.	2·75 gal.	10· "	2·0 "	.....
6476	12/5	0 apples.	1·75 "	5 "	0 apples.	.....
6481	12/10	2 gal.	10·0 "	9 "	0 "	.....
Yearly totals	.....	2·75 gal.	17·75 gal.	40 gal.	6· gal.	66·50 gal.

KEEPING TEST OF SOME COMMERCIAL VARIETIES OF APPLES.

The following table gives in a brief manner the results of keeping tests with a number of commercial varieties of apples. As it is often necessary to know the average length of season of a variety together with its keeping qualities, this table should prove quite useful. Throughout this test notes were taken from week to week on the condition of the fruit, and as soon as the variety was seen to be past condition the test was discontinued for that particular variety, as its season was considered to be over. The last column gives the average length of season for each variety tested, while the preceding column gives an idea of the keeping qualities of the variety during the time it should remain in good eating condition. These apples were kept in a cool rather dry cellar such as any private person might have. The temperature averaged about 38° F. during the winter. The fruit was in open baskets, there being usually 50 specimens of each variety.

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Year.	Variety.	Test began.	Out of Season	No. days in season.	% Rotted	Average Length of Season. Days.
1911-12	Baxter	24-X	15-V	202	74	
1912-13	"	1-XI	4-IV	155	20	
1913-14	"	10-XI	25-V	196	68	184
1911-12	Bethel	24-X	15-V	195	54	
1912-13	"	1-XI	4-IV	155	32	
1913-14	"	10-XI	6-IV	147	6	
1914-15	"	5-XI	6-V	182	4	170
1911-12	Canada Baldwin	24-X	1-V	189	54	
1912-13	"	1-XI	11-IV	162	40	
1913-14	"	10-XI	25-V	196	84	
1914-15	"	5-XI	1-IV	147	8	173
1912-13	Canada Red (Roseau)	1-XI	13-VI	225	14	
1913-14	"	10-XI	25-V	196	26	
1914-15	"	5-XI	27-V	204	16	208
1912-13	Fameuse	1-XI	3-I	64	0	
1913-14	"	10-XI	8-XII	28	0	
1914-15	"	5-XI	17-XII	42	0	45
1912-13	Haas	1-XI	3-I	64	8	
1914-15	"	5-XI	24-XII	49	2	56
1911-12	La Victoire	24-X	1-V	189	48	
1912-13	"	1-XI	2-V	183	28	
1913-14	"	10-XI	25-V	196	34	
1914-15	"	5-XI	22-IV	168	0	184
1911-12	McIntosh Red	24-X	13-III	140	74	
1912-13	"	1-XI	7-III	127	50	
1913-14	"	10-XI	23-II	105	56	
1914-15	"	5-XI	18-II	105	8	119
1911-12	McMahan White	24-X	24-I	92	36	
1912-13	"	1-XI	3-I	64	8	
1913-14	"	10-XI	5-I	56	18	
1914-15	"	5-XI	7-I	63	6	69
1911-12	Milwaukee	24-X	20-III	147	44	
1912-13	"	1-XI	21-II	113	6	
1913-14	"	10-XI	23-II	105	16	
1914-15	"	5-XI	28-I	84	0	112
1913-14	N. W. Greening	22-X	27-V	189	50	
1914-15	"	5-XI	29-IV	175	42	182
1911-12	Patten Greening	24-X	10-I	78	6	
1912-13	"	1-XI	10-I	71	10	
1913-14	"	10-XI	12-I	63	14	71
1912-13	Ribston Pippin	1-XI	5-II	97	56	
1913-14	"	10-XI	1-XII	21	0	59
1911-12	Scott Winter	24-X	1-V	189	50	
1912-13	"	1-XI	18-IV	169	10	
1913-14	"	10-XI	13-IV	154	0	
1914-15	"	5-XI	1-IV	147	2	165
1911-12	Stone	24-XI	8-V	165	64	
1912-13	"	1-XI	2-V	183	72	
1913-14	"	10-XI	11-V	182	10	
1914-15	"	5-XI	22-IV	168	26	174
1911-12	Winter St. Lawrence	24-10	10-I	78	80	
1912-13	"	1-XI	24-I	85	10	
1913-14	"	10-XI	5-1	56	28	73
1912-13	Wolf River	1-XI	24-1	85	30	
1913-14	"	10-XI	19-I	70	46	
1914-15	"	5-XI	24-XII	48	16	68
1911-12	Rochelle	24-X	10-I	78	100	
1912-13	"	1-XI	7-II	99	100	
1913-14	"	10-XI	2-II	84	70	
1914-15	"	5-XI	4-III	119	100	95

DATES OF BLOOMING OF DIFFERENT VARIETIES OF APPLES.

In planting or laying out a young orchard, the question of the system of arranging the different varieties is one of the important considerations. It is known that certain varieties of apples are practically self-sterile, and in fact, some investigators have gone so far as to state that very few varieties of apples are self-fertile to any extent. This opens up the question, therefore, of whether it is really advisable to plant large blocks of only one variety of fruit, or whether it is not better to have two or three varieties in the same area. Of course, there are many large blocks of a single variety which are bearing excellent crops, thus showing that these single variety areas can, in some cases, yield good results. On the other hand, one variety areas have been known never to produce a really profitable crop, while in the same neighbourhood, a number of trees of the same variety planted among other varieties have continually produced profitable yields. The conclusion, therefore, is that while some varieties are capable of self-pollination under field conditions, other varieties are not capable of such to a profitable extent.

To date, comparatively little is known regarding which varieties are, and which are not, capable of self-fertilization, so that there is no very accurate key or list to which a grower can turn to obtain information on this point. Some information will be found in that part of this report dealing with plant breeding. It is known that practically any commercial variety of apples will cross with or fertilize any other variety. This then suggests the planting in close proximity of those varieties which bloom together, that is come into full bloom on the same day. It will be readily seen that a variety which does not come into bloom until a day or so after another particular variety, stands less chance of being fertilized by that variety, than if they had both bloomed on the same day. As notes on the dates of blooming have been taken at the Central Farm for a number of years, a source of information is at hand which will give a good idea as to the difference in the dates of blooming of early and late varieties.

Following is a table, showing the date when each variety began to bloom, when in full bloom and when out of bloom during the last five years.

DATES of Apple Bloom.

Variety.	Began to Bloom.					Full Bloom.					Out of Bloom.				
	1911	1912	1913	1914	1915	1911	1912	1913	1914	1915	1911	1912	1913	1914	1915
Baxter	17-v	24-v	6-v	21-v	.....	20-v	28-v	15-v	23-v	.....	26-v	2-vi	30-v	28-v	.....
Bethel	17-v	25-v	10-v	22-v	13-v	20-v	29-v	17-v	24-v	20-v	24-v	3-vi	30-v	30-v	29-v
Canada Baldwin	16-v	25-v	8-v	22-v	12-v	19-v	28-v	14-v	24-v	19-v	24-v	2-vi	28-v	31-v	29-v
Canada Red	16-v	24-v	10-v	22-v	13-v	19-v	27-v	17-v	24-v	19-v	24-v	2-vi	30-v	30-v	27—v
Duchess of Oldenburg	16-v	22-v	6-v	19-v	11-v	19-v	26-v	15-v	22-v	19-v	24-v	31-v	29-v	27-v	27-v
Dudley	15-v	23-v	6-v	19-v	11-v	19-v	28-v	15-v	22-v	19-v	24-v	3-vi	30-v	29-v	27-v
Fameuse	16-v	24-v	8-v	22-v	11-v	20-v	28-v	16-v	24-v	19-v	26-v	3-vi	28-v	30-v	27-v
Gano		24-v	10-v	22-v	12-v	.....	28-v	17-v	24-v	20-v	.....	2-vi	31-v	28-v	27-v
Haas	15-v	23-v	6-v	21-v	12-v	19-v	27-v	15-v	24-v	20-v	24-v	2-vi	30-v	30-v	27—v
Langford Beauty	16-v	24-v	6-v	21-v	12-v	19-v	29-v	15-v	23-v	19-v	24-v	3-vi	29-v	29-v	27-v
La Victoire		23-v	6-v	20-v	11-v	.....	27-v	14-v	23-v	20-v	.....	2-vi	30-v	28-v	27-v
McIntosh Red	16-v	25-v	8-v	23-v	13-v	20-v	28-v	17-v	26-v	19-v	25-v	3-vi	29-v	31-v	29-v
McMahan	16-v	25-v	9-v	23-v	13-v	19-v	29-v	17-v	25-v	20-v	22-v	4-vi	29-v	31-v	29-v
Milwaukee	16-v	24-v	6-v	20-v	19-v	20-v	26-v	15-v	23-v	19-v	25-v	31-v	29-v	30-v	27-v
North Western Greening	16-v	25-v	10-v	22-v	.....	19-v	29-v	17-v	24-v	.....	24-v	3-vi	29-v	29-v	.....
Patten Duchess	14-v	23-v	5-v	19-v	11-v	18-v	27-v	9-v	22-v	19-v	24-v	2-vi	26-v	28-v	27-v
Patten Greening	15-v	23-v	6-v	20-v	11-v	19-v	26-v	15-v	22-v	19-v	24-v	31-v	30-v	28-v	27-v
Ribston Pippin	16-v	24-v	9-v	21-v	12-v	19-v	29-v	17-v	23-v	20-v	24-v	3-vi	31-v	29-v	27-v
Scott Winter	15-v	24-v	8-v	21-v	11-v	18-v	29-v	16-v	24-v	19-v	22-v	3-vi	28-v	29-v	27-v
Stone	17-v	25-v	9-v	22-v	13-v	20-v	28-v	17-v	24-v	20-v	26-v	3-vi	30-v	29-v	29-v
Switzer	5-v	23-v	7-v	19-v	10-v	18-v	26-v	14-v	22-v	19-v	24-v	29-v	29-v	28-v	26-v
Tetofsky	.....	22-v	.....	18-v	.....	.....	26-v	.....	22-v	.....	.....	31-v	.....	28-v	.....
Yellow Transparent	16-v	23-v	8-v	19-v	.....	19-v	27-v	18-v	22-v	.....	22-v	31-v	29-v	27-v	.....
Wealthy	16-v	24-v	6-v	20-v	11-v	20-v	28-v	14-v	23-v	20-v	25-v	2-vi	30-v	28-v	27-v
Winter St. Lawrence	16-v	23-v	6-v	20-v	12-v	20-v	26-v	15-v	23-v	20-v	25-v	31-v	31-v	28-v	27-v
Wolf River	17-v	25-v	8-v	21-v	12-v	20-v	28-v	16-v	23-v	20-v	26-v	2-vi	30.v	29-v	27-v
Alexander	16-v	24-v	7-v	21-v	12-v	20-v	27-v	18-v	23-v	26-v	24-v	1-vi	30-v	27-v	27- v
Lowland Raspberry	16-v	24-v	8-v	21-v	11-v	20-v	26-v	17-v	24-v	17-v	24-v	1-vi	29-v	27-v	26-v
Red June	15-v	.....	7-v	22-v	12-v	19-v	.....	17-v	24-v	17-v	23-v	.....	30-v	28-v	27-v
Scarlet Pippin	16-v	23-v	6-v	20-v	11-v	16-v	26-v	14-v	23-v	13-v	24-v	31-v	30-v	28-v	26-v
Hibernal	16-v	24-v	7-v	20-v	11-v	19-v	27-v	17-v	23-v	16-v	24-v	2-vi	29-v	28-v	26-v

To summarize the full bloom portion of the foregoing table it is found that all the varieties on the average came into full bloom within a period of five days. This is not as much difference as might be expected between early and late varieties, but still a difference of sufficient importance, perhaps, to prevent some of the earlier varieties from being appreciably pollinated by some of the later ones.

Following are three lists, giving those varieties which bloom on the same date in separate groups:—

LOT No. 1.

Scarlet Pippin, Yellow Transparent, Tetofsky — All bloom on the average on May 19.

LOT No. 2.

Duchess, Patten Greening, Switzer, Blushed Calville, Hibernal, Red June — All bloom on the same day on the average on May 20.

LOT No. 3.

Canada Baldwin, Canada Red, Dudley, Haas, Langford Beauty, La Victoire, Milwaukee, Scott Winter, Wealthy, Winter St. Lawrence, Wolf River, Charlamoff, Lowland Raspberry — These varieties bloom on the average on May 21.

LOT No. 4.

Baxter, Bethel, Fameuse, Gano, McIntosh, North Western Greening, Ribston, Stone, Alexander — These varieties all bloom on the average on May 22.

PRACTICAL APPLICATION OF THE FOREGOING.

Until some concrete evidence is available regarding the sterility of all the different commercial varieties and the affinity of those varieties for one another, it would appear (1) that it is a wise policy or precaution for orchardists to plant a number of varieties in the same area, rather than to separate the varieties into different blocks; (2) that it is advisable to plant those varieties near each other which bloom on the same day. Thus a prospective planter could, in laying out his orchard, plant the varieties from Group No. 1 close to each other, those from Group No. 2 in another block close to each other and so on. In this way, a precaution against the loss of crop due to sterility could easily be taken.

A FEW NEW OR NOT WELL-KNOWN VARIETIES OF FRUITS.

PLUMS.

As numerous communications are received requesting information on the varieties of plums adapted to northern and colder districts, a few notes calling attention to the best of the hardy varieties should not be amiss.

The hardy plums that may be recommended for the colder parts of Canada divide themselves into three groups, viz., the Americana, the Nigra and the Hybrids.

OTTAWA.

Americana Plums: The Americana plums, although not in a class with the European varieties for quality, have been improved considerably the last few years and offer a few good varieties for table use and culinary purposes. The chief objection to this class of plum is its thick skin and in very many instances its watery flesh, which is distinctly dffierent from the thin-skinned, meaty European varieties. Among the best of this group are:—

(1) Brackett, which is of good quality, large in size, firm, but with a tough thick skin, very good for dessert use.

(2) (Admiral) Schley, of very good quality, good size, skin thinner than Brackett. Probably the best Americana in quality.

(3) Terry, this variety is well worth a trial, being classed with the two previous varieties as of good quality and size. It possesses the advantage of a thin although tough skin together with handsome appearance, firm flesh and good quality.

Nigra Plums.—The varieties of the Nigra group are distinct from the Americanas by the fact that they possess a much thinner and more tender skin. They are more useful on this account for culinary purposes. On the other hand, their flavour is not so pleasing for eating out of hand. On this account, their value is often overlooked by people who gauge a plum's merit only by its dessert qualities. The Nigra plums are also earlier than the Americanas. Among the best is Cheney, a large plum with a moderately thin skin which is only moderately tough, good quality and moderately rich in flavour..

Hybrids.—Among the Hybrid plums is one which is a distinct acquisition to the hardy fruits of North America. This is Omaha, a plum of medium size, handsome appearance, early, very good quality, thin and tender skin, hardy and productive. This variety is one that should be largely planted by the plum growers who are obliged to depend upon the hardy sorts. It is excellent for both dessert and culinary purposes.

APPLES.

Red June.—As an early hardy apple of good quality, Red June stands out quite prominently. As grown on this Farm, it is an excellent keeper for such an early fruit, thus rendering it possible to ship this variety with comparative safety. Its deep red colour is also a noteworthy feature for such an early variety. Its average season is about two weeks later than Crimson Beauty, the next mentioned variety. It is generally ready for shipping during the first week of August. A description follows:—Medium in size; conical; yellow, almost completely covered with a deep, crimson red; skin smooth, thin and tender; flesh mellow, tender and moderately juicy; flavour sub-acid, very pleasing. Further experience in regard to hardiness is required.

Crimson Beauty.—Probably the earliest variety of apple tested at this Farm. Although rather coarse and poor in quality, it is noteworthy on account of earliness and high colour.

Description.—Medium in size; oblate, slightly angular; green covered with bright crimson especially on sunny side; skin tough and thick; flesh yellowish, coarse; flavour acid; quality medium.

GRAPES.

Peabody.—Among the numerous varieties of grapes tested at Ottawa few are sufficiently early to ripen every year in the short season of that district. One of the best of these short seasoned varieties is Peabody, which is a blue grape of medium size; quality good; flavour briskly sub-acid. This variety is well worth a trial in the northerly districts. The skin is thin and robins are very fond of it and often destroy many fruits.

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Cottage.—This grape may be recommended only on account of its extreme earliness and relatively good quality. On account of its dropping habit, it is useless as a commercial grape. For home planting, however, it is especially recommended. It is a large, light blue grape, of very mild, sweet and pleasing flavour.

STRAWBERRIES.

Much attention has been paid in the past to variety testing of strawberries at this Farm and the result of a two years' test is given in the following pages. The results here recorded are for 1912 and 1914. The fruit table (No. 1), gives the best fifty varieties of strawberries, based on average yield for the two years. Table No. 2, gives a list of the best newer varieties, which fruited for the first time in 1914. For comparison, the yields of a few well-known varieties have been appended to this table.

In determining which is the best variety of strawberries, we cannot go entirely by yield, there are other factors to be considered, such as season, quality, firmness, appearance and ability to retain size for a considerable time.

Season.—Refers to the time when the variety yields its crop, such as whether it is an early, main crop, or late variety. As the markets at the commencement of the strawberry season invariably offer higher prices for fruits than they do a few days later, a grower is always anxious to have a good crop of early fruit in order to command the top prices. In selecting an early variety, therefore, it might be advisable to sacrifice quality and total yield for the sake of earliness. On the other hand, in selecting a main crop variety, a better balance of all these factors is necessary for the main crop berry is in keener competition than the early berry and to yield profitable returns must be a good all round berry. That is to say, it should be a good yielder, a good shipper, must have good appearance and should be at least medium in quality.

Besides early and main crop varieties, there are many berries which yield a considerable portion of their crop at the very latter end of the season. As at the beginning of the season, the market then is quite often much higher than during the height of the season, so that late berries often pay as well as early ones.

As the records at the Central Farm show the date of each picking of each variety, together with the amount picked, it has been possible to average the varieties according to their merits as early or late berries. Table No. 3 gives the standing of the best early varieties, arranged in order of total yield during the first week of the strawberry season. This method or system of arrangement has been adopted in preference to the arrangement by the date of the first ripe fruit on account of the fact that many varieties, which ripen a few days earlier than some others, will not continue to yield early fruit in any quantity, and, therefore, are misleading. As the season is dated from the first picking made from the plantation, all varieties are thus fairly compared as to relative earliness. Table No. 4, on the other hand, gives the standing of the best late varieties, arranged in order of total yield during the last week of the strawberry season, the end of the season dating from the last picking made from the plantation as a whole. Over three hundred and fifty varieties were in this test. These tables, therefore, convey a fairly accurate idea of the points of merit of the different varieties in so far as earliness, lateness and total yield are concerned, while Table No. 5, gives a test of those varieties which maintain their size for the longest period.

This leaves the points of quality, attractiveness, and firmness to be discussed.

As space will not permit of a discussion of these points for all varieties, lists have been appended of the varieties recommended for different purposes and in connection with these lists, notes are attached concerning these three points. If a variety, which is a high yielder, does not appear in these lists, it has been left out on account of its very poor quality or some other very important point in which it lacks.

OTTAWA.

TABLE No. 1.—Best Yielding Varieties of Strawberries, based on total average yield for 1912 and 1914.

Variety.	Yield per acre.	1st ripe fruit.	Length of season in days	Height of season in days	No. pickings.	Retained size days.
	lb. oz.	1912 1914				
1 Parsons Beauty, per	12053 - 8	27-vi - 30-vi	20·5	4·5	8·5	14·5
2 Mele, imp	12040 - 9	26-vi - 27-vi	22·5	6·5	9	14·5
3 Cordelia, per	12016 - 1	24-vi - 24-vi	27	11	10·5	16
4 Dora, imp	11624 - 14	24-vi - 27-vi	23·5	9·5	9·5	10
5 Mariana, per	10907 - 13	27-vi - 28-vi	22·5	12	9·5	15
6 Bisel, imp	10872 - 1	25-vi - 28-vi	23·5	8·5	9·5	14·5
7 Greenville, imp	10068 - 4	24-vi - 26-vi	25	7	10	20·5
8 Commander, per	10049 - 11	25-vi - 26-vi	23·5	9·5	8·5	18·5
9 New Globe, per	9977 - 19	27-vi - 30-vi	24·5	8·5	9·	19·5
10 Pocomoke, per	9916 -	28-vi - 29-vi	20·5	4·5	9·	20·5
11 Buster, imp	9935 - 7	27-vi -	26	11·5	9·5	20
12 Valeria, per	9836 - 10	26-vi - 27-vi	26·5	7	11	12
13 Clyde, per	9805 -	24-vi -	25	8	11	21
14 Bederwood, per	9779 - 14	19-vi - 21-vi	29	6·5	12	20
15 Daniel Boone, imp	9402 - 5	25-vi - 27-vi	24	11	9·5	11
16 Lavinia, per	9384 - 8	26-vi - 27-vi	26·5	8·5	9·5	12·5
17 Arnout, per	9296 - 14	24-vi - 27-vi	26	11	9·5	18
18 Maggie, imp	9232 - 2	19-vi - 24-vi	27·5	8·5	11	14·5
19 Lovett, per	8924 - 4	24-vi - 26-vi	25	10	10	15
20 Williams, per	8903 - 14	24-vi - 27-vi	23·5	7·5	10	15
21 Sutherland, imp	8669 - 2	24-vi - 27-vi	25	8	9·5	14·5
22 Fountain, per	8665 - 10	24-vi - 26-vi	22·5	5·5	8·5	15
23 Cassandra, per	8651 - 6	24-vi - 27-vi	23·5	16·5	9	12·5
24 Hermia, per	8645 - 8	27-vi -	25	10	9·5	15
25 Thompson Earliest, per	8612 - 5	19-vi - 21-vi	27·5	6·5	11·5	16·
26 Sample, imp	8611 - 2	24-vi - 25-vi	25·5	16·5	9·	20
27 Abundance, imp	8570 - 2	24-vi - 27-vi	24·5	9·5	10·5	15·5
28 Brilliant, imp	8501 - 5	27-vi - 29-vi	25	8	9	13·5
29 Afton, imp	8485 - 14	22-vi - 23-vi	25	9	9·5	11
30 Morgan Favourite, per	8371 - 11	29-vi - 30-vi	19	7	8	13·5
31 Ruby, per	8324 - 11	26-vi - 27-vi	23·5	8·5	9·5	20·5
32 New Dominion, per	8293 - 14	26-vi - 29-vi	22	9	8·5	11·5
33 Howard No. 2, imp	8246 - 14	22-vi - 24-vi	27	10·5	10·5	16
34 Daisy, imp	8243 - 10	24-vi - 27-vi	24·5	13·5	9	18
35 Hattie Warfield, imp	8197 - 7	24-vi -	26	8	10·5	16
36 Warfield No. 2, imp	8117 - 7	23-vi - 26-vi	23	8·5	8·5	13·5
37 Portia, imp	8005 - 7	27-vi - 30-vi	23·5	11	9	12
38 Irene, imp	7775 - 5	24-vi - 27-vi	23·5	8·5	9·5	15·
39 Scofield Seedling, per	7738 - 13	27-vi -	22	7·5	9·5	15·5

40 King Edward, per	7686 - 3	25-vi - 27-vi	23	8·5	9	10·5
41 Ophelia, per	7539 - 12	27-vi -	25	6·5	10	14
42 Carrie, imp	7435 - 8	26-vi - 27-vi	23·5	6·5	9·5	15·5
43 Viola, imp	7405 - 8	26-vi - 30-vi	23·5	9	9	14·5
44 Seedling from Livingstone, per	7397 - 11	27-vi - 28-vi	22·5	9	8·5	20
45 Howard No. 17, per	7290 - 12	19-vi -	28	10·5	11	20·5
46 From A. Shaw, per	7285 - 6	27-vi - 1-vii	20·5	8	7·5	12
47 Hatch Experiment Station, imp	7191 - 5	27-vi - 30-vi	20·5	8·5	8	13
48 Bismarck, per	7041 - 3	26-vi -	27	6	9·5	15
49 Quality, per	7031 - 8	26-vi -	23	9	8·5	14
50 Marie, imp	7016 - 14	24-vi - 27-vi	24·5	8·5	9·5	17

EXPLANATION OF THE TABLE.

The column marked "1st ripe fruit" shows the range between dates of ripening for the two years; "Length of season" refers to the number of days between first and last pickings; "Height of season" gives in days from the first picking the average date or time when the largest picking of the season was made; "No. of pickings" simply refers to the average number of pickings for the two years; "Retained size" refers to the average number of days that each variety kept up its size.

The Parsons Beauty which heads the list is a fine variety and is now grown extensively in some districts. Mele is a very productive berry but is too soft for distant shipment. Cordelia is a promising new variety originated at the Experimental Farm, Ottawa, as is the Mariana. Dora has done well at Ottawa for many years but has not been much planted. The Bisel and Greenville have continued to yield well at Ottawa for many years and are two good varieties. The same variety rarely heads the list two years in succession as it is practically impossible to have exactly the same relative stand of plants each year unless they are grown by the hill system, which has not been found satisfactory at Ottawa. It is therefore desirable to have several years' experience with each sort so that a good average may be obtained.

It is interesting to note that in this list of fifty most productive sorts, there are fifteen varieties that have been under test twenty years and more, the Bisel and Greenville being two of these, which shows that these two sorts are very vigorous and productive.

TABLE No. 2.

This table gives a list of the most promising of the newer varieties grown in 1914, arranged in order of total yield. Varieties marked with an asterisk are older varieties inserted for sake of comparison. All yields in this table are computed from 1914 records.

No.	Variety.	Yield per acre.	1st ripe fruit.	Length of season.	Height of season.	No. of pickings.	Holds size for.	Remarks.
		lb. oz.		days.	days.		days.	
1	*Pocomoke, per	12640 – 1	29 – vi	21	3	10	23	Above medium, very firm.
2	*Splendid, per	12056 – 13	19 – vi	23	4	11	15	Soft and poor colour.
3	*Sample, imp	11391 – 13	25 – vi	27	23	11	25	Med. quality, moder. firm.
4	Bradley, per	10488 – 1	27 – vi	23	11	10	18	
5	Monroe, per	10462 – 2	26 – vi	26	13	11	23	Very good quality.
6	Rewastico, per	9645 – 6	30 – vi	20	6	9	13	Med. quality.
7	Winner, per	7454 – 5	27 – vi	25	9	11	19	
8	Gov. Forte, per	9334 – 3	27 – vi	25	7	11	13	Good quality.
9	Sou Pet	8932 – 5	26 – vi	26	12	11	23	Poor quality.
10	Helen Davis, per	8478 – 9	27 – vi	25	9	11	19	Excellent quality.

*For comparison with new varieties.

Of these seven newer varieties, Monroe, Gov. Forte and Helen Davis are the most promising from the standpoint of both yield and quality. None of these varieties is promising as regards earliness; they are all main crop varieties.

It has been found that notwithstanding the many new sorts that are introduced every year it is only now and then that there is one which compares favourably with those which have become popular through long years of experience. It will be seen in this table that none of the newer sorts yields as well as the Pocomoke, Splendid and Sample, which are very productive berries. It is only by introducing new sorts, however, that better ones will be obtained, and it is the duty of the Experimental Farms to find out which of the new ones are as good or better than the old ones.

TABLE No. 3.—List of best yielding early varieties of Strawberries based on a two years' average of the yield for the first week of the strawberry season.

No.	Variety.	Average yield per acre for 1st 7 days.	Note on size and quality.	Colour.	Firmness.	2 yr. average of total yield.
		lb. oz.				lb. oz.
1	Thompson Earliest, per	2644 - 14	above med., med...	deep pale red	rather soft	8617 - 5
2	Splendid, per	2458 - 5	good	pale red	mod. firm	4840 - 9
3	Bederwood, per	2391 - 13½	above med	bright red	firm	9779 - 15
4	Maggie, imp	2388 - 9	medium	deep red	mod. firm	9232 - 2
5	Excelsior, per	2358 - 10	too acid	bright red	mod. firm	4586 - 14
6	Bonita, imp	1680 - 7	poor and small	dark red	soft	9317 - 9
7	Clyde, per	1523 - 4	large and good	pale red	firm	9805 - 0
8	Howard No. 17, per	1497 - 5	large and below med.	bright red	firm	7290 - 12
9	Wildwood, imp	1472 - 15½	large and good	bright scarlet	mod. firm	3725 - 10
10	Fairfield, per	1423 - 9	med. size and mod. good.	good colour		3300 - 14
11	Chas. Newman, per	1337 - 5½				4800 -
12	Hawaii, per	1181 - 13½	poor	poor, not desirable		5501 - 3
13	Goree, per	1137 - 8½				3279 - 15
14	Wesley, per	1119 - 11½				6761 - 2
15	Lester Lovett, per	1114 - 14	med. and good	dark red		10499 - 7
16	Lucetta, per	1112 -				4095 -
17	Miranda, per	1047 - 11	large, good	dark red	firm	5828 - 3
18	Howard No. 2, imp	1019 - 4½	med., above med...	bright scarlet	only mod. firm	8246 - 14
19	Hero, per	1007 - 15	large and above med.	rather pale	mod. firm	6290 - 6
20	Mrs. Cleveland, imp	992 - 3½	small and poor	pale red		4894 - 13

Better early varieties are very much needed, as none of those in the above table which are near the head of the list is entirely satisfactory. For many years the Beder Wood has been the most reliable early berry and is still being grown quite extensively, but it soon gets small. Excelsior is grown in some places, but it is too acid to be very desirable. Splendid gives a large percentage of early fruit but it is not quite attractive enough in colour, and Thompson Earliest is rather soft.

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TABLE No. 4.—List of best bearing late varieties, average for two years of the yield during the last seven days of the picking season.

No.	Variety.	Average yield per acre for last 7 days.	Note on size and quality.	Colour.	Firmness.
		lb. oz.			
1	Beidler	996 - 15	large and medium	bright red	firm.
2	Buster, imp	979 - 4	large, above medium	bright pale red	firm.
3	Wm. Belt, per	797 - 3	large and very good	bright red	firm.
4	July, imp	771 - 6	medium and poor	pale red	soft.
5	Ruby, per	737 - 13	large and medium	dark red	medium.
6	Sample, imp	641 - 11	large and medium	bright red	mod. firm.
7	Cordelia, per	606 -	large and medium	bright red	firm.
8	Glen Mary, per	476 - 10	large and medium	deep red, pale tip	firm.

It has been found that the most profitable late berries are those which give a large crop in mid-season, but continue cropping until late and keep up the size of fruit. Those which do not ripen any fruit until late are usually caught by the dry weather before a large proportion of the fruit ripens, with the result that the crop is small. Buster, Sample and Glen Mary are all of this character. At Ottawa the Wm. Belt has not proved very productive, but it is one of the best of the later sorts so far as appearance, size and quality are concerned.

TABLE No. 5.—List of best varieties for holding size, based on a two years' average

Variety.	Retained size for Days.
1. Clyde, per.	21
2. Glen Mary, per.	20·5
3. Highland, imp.	20·5
4. Howard No. 17, per.	20·5
5. Greenville, imp.	20·5
6. Abington, per.	20·5
7. Pocomoke, per.	20·5
8. Ruby, per.	20·5
9. Sample, imp.	20
10. Beder Wood, per.	20
11. Beidler, imp.	20
12. Buster, imp.	20
13. Hood River, per.	20
14. Uncle Jim, per.	20
15. New Globe, per.	19·5

WELL-KNOWN VARIETIES OF STRAWBERRIES RECOMMENDED FOR PLANTING, ARRANGED IN ORDER OF GENERAL MERIT.

Early Varieties.—Beder Wood, per.; Splendid, per.; Thompson Earliest, per.; Excelsior, per.

Main Crop Varieties.—Parsons Beauty, per.; Greenville, imp.; Pocomoke, per.; Buster, imp.; Clyde, per. (suffers during drought); Williams, per.; Sample, imp.; Senator Dunlap, per.

Late Varieties.—Buster, imp.; Wm. Belt, per.; Sample, imp.; Glen Mary, per.

In addition to the above, the following not so well-known varieties are especially recommended for main crops. These varieties are very productive, of good quality and colour and are moderately good shippers. Where obtainable they are well worth a trial. The list is as follows: Dora, imp.; Bisel, imp.; Valeria, per.; Portia, imp.; Mariana, per.; Lavinia, per.; Hermia, per.

GREENHOUSE GRAPES.

The growing of grapes under glass by the pot culture method was dealt with in last year's report, but in order that persons interested may keep in touch with the progress these pot-grown vines are making, a record of their production during this past season is given together with their total production since the time of starting the experiment. As the individual yield of each vine is given, a clearer conception of the possibilities of this method is obtained.

It will be noticed that there is a considerable difference between the yield of different varieties, also that different vines of the same variety show a distinct individuality in yielding habit. Black Hamburgh and Foster Seedling are distinctly the leaders in yield. The latter is one of the earliest and the former a mid-season grape. Black Hamburgh is one of the best in quality and Foster Seedling may be termed good.

From experience at this Farm, the following varieties of hot house grapes are recommended:—

For Commercial Planting—

Early: Foster Seedling.
Late: Black Hamburgh.

For Home Use—

Early: Foster Seedling and Buckland Sweetwater.
Late: Black Hamburgh, Muscat Hamburgh and Muscat of Alexandria.

OTTAWA.

Grapes in Greenhouse.

Variety.	No. of vine.	Yield 1914.	Yield 1915.	Total Yield.	Average total yield per vine.	Average yearly yield per vine.
		lb. oz.	lb. oz.	lb. oz.	lb. oz.	lb. oz.
Gros Colman	1	4 – 12	1 – 1	5 – 13		
Gros Colman	43	– 13	1 – 2	1 – 15		
Gros Colman	47	2 – 11	.....	2 – 11		
Total	.....	8 – 4	2 – 3	10 – 7	3 — 7·5	1 – 12
Frankenthal	2	7 – 4	5 – 10	12 – 14		
Frankenthal	30	7 – 14	14 – 13	22 – 11		
Total	.....	15 – 2	20 – 7	35 – 9	17 – 12·5	4 – 7
Buckland Sweetwater	3	4 – 4	1 – 8	5 – 12		
Buckland Sweetwater	10	4 –	1 – 4	5 – 4		
Total	.....	8 – 4	2 – 12	11 –	5 – 8	1 – 6
Muscat Hamburgh	4	5 – 8	7 – 7	12 – 15		
Muscat Hamburgh	33	5 –	– 7	5 – 7		
Muscat Hamburgh	37	4 – 8	1 – 10	6 – 2		
Muscat Hamburgh	41	.....	11 – 9	11 – 9		
Total	.....	15 –	21 – 1	36 – 1	9 –	4 – 8
Madresfield Court	5	5 – 10	.....	5 – 10		
Madresfield Court	11	2 –	.....	2 –		
Madresfield Court	38	3 – 4	2 – 7	5 – 11		
Madresfield Court	44	1 –	.....	1 –		
Total	.....	11 – 14	2 – 7	14 – 5	3 – 9	1 – 12·5
Foster Seedling	6	5 – 4	10 – 12	16 –		
Foster Seedling	12	8 – 14	4 – 4	13 – 2		
Foster Seedling	19	5 – 3	4 –	9 – 3		
Foster Seedling	39	6 – 13	13 – 1	19 – 14		
Total	.....	26 – 2	32 – 1	58 – 3	14 – 8·75	7 – 4·37
Black Hamburgh	7	10 – 5	9 – 12	20 – 1		
Black Hamburgh	8	3 – 14	6 – 4	10 – 2		
Black Hamburgh	20	6 – 15	6 – 15	13 – 14		
Black Hamburgh	28	7 – 5	8 – 6	15 – 11		

Black Hamburgh	31	7 –	11 – 2	18 – 2		
Black Hamburgh	40	7 – 5	17 – 11	25 –		
Total		42 – 12	60 – 12	102 – 14	17 – 2·33	8 – 9·16
Gros Maroc	9	3 – 14	1 – 8	5 – 6		
Gros Maroc	35	4 – 9	5 – 7	10 –		
Total		8 – 7	6 – 15	15 – 6	7 – 11	3 – 13·5
Mrs. Pearson	13	2 –	– 13	2 – 13		
Mrs. Pearson	32	4 – 3	.....	4 – 3		
Total		6 – 3	– 13	7 –	3 – 8	1 – 12
Alnwick Seedling	15	1 –	1 – 3	2 – 3		
Alnwick Seedling	29	1 – 8	.....	1 – 8		
Total		2 – 8	1 – 3	3 – 11	1 – 13·5	– 14·75
Black Alicante	17	3 – 3	.....	3 – 3		
Black Alicante	46	6 – 8	.....	6 – 8		
Total		9 – 11	.....	9 – 11	4 – 13·5	2 – 6·75
Mrs. Pince	18	1 –	.....	1 –		
Mrs. Pince	45	1 –	.....	1 –		
Total		2 –	.....	2 –	1 –	– 8
Muscat of Alexandria	21	1 – 8	1 – 1	2 – 9		
Muscat of Alexandria	22	2 – 8	3 – 14	6 – 6		
Muscat of Alexandria	23	2 –	3 – 8	5 – 8		
Muscat of Alexandria	24	3 –	8 – 1	11 – 1		
Total		9 –	16 – 8	25 – 8	6 – 6	3 – 3
Lady Downes Seedling	25	2 – 7	1 – 8·5	3 – 15·5		
Lady Downes Seedling	26	2 – 8	2 – 5	4 – 13		
Total		4 – 15	3 – 13·5	8 – 12·5	4 – 6·2	2 – 3·1
Prince of Wales	27	4 – 12	.....	4 – 12		
Prince of Wales	36	3 – 4	.....	3 – 4		
Total		8 –	.....	8 –	4 –	2 –

FURTHER EXPERIMENTS WITH ORCHARD HEATERS AND FROST-PROTECTION.

Experimental work in frost protection was continued this past season. The results bear out our former conclusions that orchard heaters are an adequate and reliable protection against frost. This season's work was conducted on a somewhat larger scale than last season's work, a number of different types of heaters being used and experiments being conducted in the orchard as well as in the strawberry patch.

RESULTS OBTAINED IN THE ORCHARD.

On the night of May 20, the heaters were lighted only in the young close-planted Wealthy orchard. Sixty-three Competition heaters were used in this experiment, these being distributed over an area of 32,564 square feet. The heaters were, therefore, used at the rate of eighty per acre. At 1 a.m. an alarm came in that the temperature had reached 34 degrees Fahr. and by 1.30, when the heaters were lighted, it had fallen to 32 degrees. The ground temperature that night fell as low as 31 degrees outside the orchard, while the ground temperature inside the orchard was never below 34 degrees after the heaters were lighted. At three feet from the ground, the temperature outside was 32 degrees, while inside it never fell below 36 degrees after lighting the heaters.

On May 27, the heaters were lighted at midnight when the ground temperature was 32 degrees, and 34 degrees was registered three feet above the ground. By 2 o'clock the temperature outside stood at 28 degrees on the ground and 32 degrees three feet above the ground, while inside the ground temperature was 33 degrees and the temperature three feet above the ground 37 degrees. On this night only forty-two heaters were used at the rate of sixty heaters per acre. This demonstrated that, in an orchard of one acre area sixty heaters of the Competition type are capable, under certain conditions, of raising the temperature of the air surrounding the trees 9 degrees. This rise would not be experienced on an open piece of land without the canopy of trees to act as protection against radiation; in fact it requires twice that number of heaters to cause a smaller rise than 9 degrees. To illustrate the difference between heating an orchard and a ground crop when the latter is situated in the open, forty-two heaters of the same size and type as the Competition were placed on an area of 15,750 square feet, or in other words, the heaters were distributed at the rate of 120 heaters to the acre. On the night of May 27 these heaters were lighted at the same time the heaters in the orchard were lighted. The minimum ground temperature inside the heated area was 28 degrees for about one-half hour at 2.30 a.m., quickly rising to 32 degrees, the outside temperature remaining at 28 degrees until 4 o'clock. Comparing this with the orchard temperature, it will be recalled that the ground temperature in that area never fell below 33 degrees, and this with only half the number of heaters per acre. In addition, a note was taken that just outside the heated orchard area the ground was frozen stiff, while inside the area no sign of frost was evident on the ground. Although the ground inside the heated area was not actually frozen in the second case, signs of frost were evident as a result of the half-hour when the temperature went to 28 degrees. The temperature at three feet above the ground was, of course, much higher, it not going below 33 degrees and then only for a short time, then rapidly rising to 34 degrees. It will be recalled that in the orchard the temperature three feet from the ground did not go below 37 degrees after lighting. This illustrates in an excellent manner, therefore, the difference between heating a ground crop and an orchard. The latter is a comparatively easy and inexpensive operation in comparison with the first.

On May 28, after the severe frost of the previous night, the strawberry bloom both inside and outside the heated area was counted and notes taken on the per-

centage of bloom injured in both cases. The count showed that over 60 per cent of the bloom outside the heated area was ruined by frost, while only 30 per cent of the bloom inside the heated area was affected. In other words, the injury outside the heated area was twice as great as the injury inside.

From the foregoing evidence in conjunction with two previous seasons' results, there is no hesitation in recommending orchard heaters for the purpose of preventing frosts in orchards. There is, however, an element of chance in connection with ground crops, such as strawberries. In addition to the difficulty of holding the temperature on the ground to a point above freezing, there is also the disadvantage and danger of the heaters boiling over, in which case a number of plants are bound to be seriously damaged. Furthermore, if straw is present in the bed, injury from fire is liable to result when a pot boils over.

As orchard heaters, therefore, do not appear to be the most perfect means of protecting ground crops, a preliminary experiment with cheese cloth covers was conducted. It was found that by suspending cheese cloth at a foot above the ground, a difference of from 4 to 6 degrees in night temperature could be effected. The cheese cloth cover seemed sufficient to retain a large portion of the soil heat which would otherwise have radiated into the atmosphere. It was also found that if the cover was left on during the day, it did not prove so effective at night, due to the fact no doubt, that when the cover was off in the day time, it gave the soil a better opportunity to absorb the sun's heat, thus giving the soil more reserve heat to be held in check by the cover at night. These cheese cloth covers are used by cranberry growers, and it is intended to try them out on a large scale this coming year at Ottawa. From the present information, it appears to be the most practical means of protecting strawberries that has yet been devised.

TYPES OF HEATER.

Six different styles of heater were used and tested during the past season, and from these tests the following recommendations are made for those who contemplate the purchase of heaters:—

1. Select a heater of large capacity, not less than four gallons.
2. Select the style which has a good draft control. Proper control of draft is very important, for it allows the operator to increase or decrease the fuel consumption, as he desires, thus increasing or decreasing the amount of heat given off per hour.
3. Round heaters are preferable to square or longitudinal ones, as they do not warp so readily.

SELF-LIGHTING HEATER.

Among the different styles of heater was one which, it was claimed would light itself at any temperature for which it was set. So far, our experience with these heaters is not such that they can be recommended. This particular style had a cover with a sensitive diaphragm that contracted as the temperature fell, thus liberating an iron arm which scratched a match, the match in turn lighting a long wick. This wick was used to tie the cover to the heater and as soon as burned off would thus release the cover, which, being attached to the heater by a tight spring on the opposite side, would thus fly off. The wick with a cork float attached would then fall into the oil and ignite it. On several occasions these heaters worked all right, but two factors rendered them unreliable. The first of these was, if the heaters were left in the field over night ready for work, the condensation, due to the difference between night and day temperature, would render the match wet and useless, or that when the spring was released the match would not ignite. This can only be prevented by daily examination, which is not practicable. The other objection is that all heavy fuel oils require

some gasoline to be put on the top of them at lighting time, and as the gasoline is put in the self-lighters at filling time, it may be evaporated before a frosty night occurs, thus, although the cover may fly off and the wick be lighted, the flame will be extinguished when it falls into the oil. These two objectionable features rendered the heaters unreliable, although on numerous occasions they worked all right. As yet, however, they cannot be recommended for general use.

A CHEAP FROST ALARM.

In previous reports, attention has been called to a frost alarm thermometer, costing about twenty or twenty-five dollars. This last year a much cheaper, but still reliable, alarm was tested. This new alarm costs not more than four dollars and consists of a metal diaphragm, which expands or contracts according to the changes in temperature. This may be so set as to ring a bell at any temperature by means of a small battery which is attached to the alarm. This alarm comes in two pieces, one piece being the sensitive diaphragm and the other the bell and battery box.

From our experience, this is quite reliable and on account of its low cost should form a part of every frost fighter's equipment.

SPRAYING.

EXPERIMENTS.

A large part of the orchard was devoted to a comparative test of several different spray mixtures as regards foliage injury only, it being impossible to report on scab control as there is practically no scab at present at Ottawa during most seasons.

The object of the test was to compare the relative values of Bordeaux mixture, lime sulphur and soluble sulphur. Plots Nos. 1, 2, and 3 were sprayed with soluble sulphur on May 7, June 4, June 24 and July 7, while plot No. 4 was sprayed on the last three dates only. The remaining plots were sprayed only once, viz., on July 12. To determine the effect of the different mixtures on the foliage, large quantities of leaves were gathered from the different plots and divided into slightly injured, badly injured and no injury groups. These were all counted and a result of this count is given in the attached plan. It may be added that the leaves were gathered by a person who only knew the location of the plots and their number, but did not know how each plot had been treated. In this way an unbiased estimate should result.

The conclusions from these results would indicate that soluble sulphur without the addition of arsenate of lead is non-injurious to the foliage or practically so, there being only 4½ per cent injury and that only slight. On the other hand, as soon as lead arsenate is added the results show a very serious burning, as will be seen by examining the record of plots Nos. 1 and No. 2, also plots Nos. 7, 11, 12 and 14. An examination of these plots will also show that either an increase of lead or an increase in the strength of the soluble sulphur will cause an increase in the burning. The burning in every case where soluble sulphur and arsenate of lead were combined was serious, and it is safe to say that these two preparations cannot be used together without the risk of obtaining serious results.

Comparing this with lime sulphur and lead arsenate, it will be seen that the burning in the case of lime sulphur was mostly slight and that even then the total injury was much less than in the case of the soluble sulphur-arsenate mixture. Bordeaux mixture gave the least injury of any of these mixtures, but possesses very slight advantage over lime sulphur in this respect. Of course, in different seasons the amount of injury from Bordeaux and lime sulphur varies as might perhaps the

injury from soluble sulphur. The risk in the case of the first two mixtures, however, is light; in fact, the amount of injury here shown may be considered as the maximum, while in the case of soluble sulphur-arsenate the risk is beyond all question and should not be taken.

SOLUBLE SULPHUR.

Although soluble sulphur has been on the market for some few years, it has not as yet enjoyed the universal popularity, which perhaps such compounds will enjoy in the near future. It has many points in its favour, such as being easy to mix, easy to store and cheap to ship. The reason for the varied opinions and conflicting results that have been obtained is due no doubt to the addition of the arsenate of lead. The chemist tells us that soluble sulphur is largely sodium or potassium sulphide. This being so, it is quite evident that upon the addition of lead arsenate there would be a chemical reaction resulting in the formation of lead sulphate and consequently the formation of either sodium or potassium arsenate. The latter are soluble, and if soluble arsenate is present in any appreciable quantity serious foliage injury may be expected.

At the time of writing, experiments are under way in which arsenate of lime is being used instead of lead arsenate. It is expected that this combination will solve the difficulty and thus place these sulphide compounds within the reach of the average grower. From the chemists' point of view, the combination of soluble sulphur and arsenate of lime should not give injurious results, as there would not be any reaction whereby soluble arsenates could be formed. It is hoped that by the end of another season some definite data will be obtained on this question.

TEST of Soluble Sulphur, Bordeaux and Lime-Sulphur, Four Sprayings, May 7, June 4, June 24, and July 7.

How Treated.	Foliage injury.		Total injury.
	Slightly burned.	Badly burned.	
	%	%	%
1. Soluble Sulphur 1 to 30, arsenate of lead 1½ lb. to 40 gal. water	47	39½	86½
2. Soluble Sulphur 1 to 40, arsenate of lead 1½ lb. to 40 gal. water	47½	32	79½
3. Soluble Sulphur 1 to 40, no arsenate of lead	4½		4½
4. Bordeaux, 4, 4, 40, 1½ arsenate of lead to 40 gal. water	30		30 (May 7 spray omitted).

How Treated.	Single Sprayings for Foliage injury.		Total injury.
	Slightly burned.	Badly burned	
	%	%	%
5. Bordeaux, 4, 4, 40, arsenate of lead 1½ lb.	23½		23½
6. Bordeaux, 4, 4, 40, arsenate of lead 2 lb.	24·2	7½	31·7
7. Soluble Sulphur 1 to 30, arsenate of lead 1½ lb. to 40 gal. water	39	29·7	68·7
8. Lime Sulphur 1 to 30, arsenate of lead 1½ lb. to 40 gal water	31·2	8·5	39·7
9. Lime Sulphur 1 to 40, arsenate of lead 1½ lb. to 40 gal. water	38·25	12·25	50·5
10. Lime Sulphur 1 to 40, arseaate lead of 2 lb. to 40 gal. water	27	1½	28½
11. Soluble Sulphur 1 to 40, arseaate of lead 1½ lb. to 40 gal. water	49	12·75	61·75
12. Soluble Sulphur 1 to 40, arsenate of lead 2 lb. to 40 gal. water	52·75	27·5	80·25
13. Lime Sulphur 1 to 40, no arsenate of lead	31·5	2·75	34·25
14. Soluble Sulphur 1 to 30, arsenate of lead 2 lb. to 40 gal. water	42·5	47·5	90

VEGETABLE GARDENING.

(M. B. Davis, B.S.A., *Assistant in Temporary Charge.*)

The past season has witnessed considerable expansion in the work of vegetable gardening. Probably the greatest acquisition to the work has been the installation of the Skinner system of irrigation, which is reported on in full in these pages. The installation of this plant places the area devoted to vegetables on an up-to-date basis and will enable a considerable increase in the experimental work, thus greatly enhancing its value.

Another development of the past season is the extension of cultural experimental work, which is gradually replacing a large part of the variety testing as sufficient average results of the latter are obtained. By substituting this work for a certain amount of variety work, it is hoped that some valuable points may be worked out before the introduction of numerous new varieties will necessitate the return of much land to variety testing again.

A start was made this year in the production of vegetable seed, and although this work is but in its infancy at this Farm and was consequently conducted on a very small scale, it is expected to increase the area devoted to this work in the very near future.

On the whole, the past season may be termed a very favourable one for vegetable gardeners. With an early spring, allowing of quick planting operations and a wet summer, the market gardener was placed in a very favourable situation. Celery and roots were exceptionally good crops, owing to excellent moisture conditions. Potatoes, on the other hand, were a practical failure for the average grower, although the man who sprayed thoroughly obtained exceedingly good yields. Owing to the wet fall, such crops as dry peas and beans suffered heavily, consequently a large proportion of poor seed of these two crops may be anticipated for the season of 1916.

In the following pages, a brief report is given of the main features of the work. As variety tests of most kinds of vegetables have been reported on from time to time, much of this has been omitted in this report.

POTATOES.

VARIETY TESTS, 1915.

The following table gives a list of the varieties tested at the Central Experimental Farm the past season, together with the rate of yield per acre of both marketable and unmarketable potatoes:—

No.	Variety.	Marketable.		Unmarketable.	
		bush.	lb.	bush.	lb.
1	Table Talk	423	30	57	12
2	Dalmeny Hero	331	6	47	30
3	New Chieftain	289	48	57	12
4	Dalmeny Regent	289	18	48	.
5	Dobbie Prolific	281	36	57	12
6	Superlative	268	24	70	24
7	Table Talk	235	24	81	24
8	Warrior (Davies)	235	24	81	24
9	Brydon	204	36	83	36
10	Aroostook Wonder	202	24	69	18
11	Factor	202	24	42	54
12	Scottish Triumph	171	36	70	24
13	The Scott	169	24	70	24
14	Up to Date	167	12	46	12
15	Brydon Beauty	162	48	71	30
16	Dreer Standard	140	48	31	54
17	Aequisition	138	36	77	..
18	Dooley	136	24	77	.
19	Sir Walter Raleigh	134	12	64	54
20	Wee McGregor	127	36	44	.
21	Clyde	114	24	28	36
22	Royalty	110	..	136	24
23	Carman No. 1	107	48	44	..
24	American Wonder	107	48	37	24
25	Nebraska	107	48	33	
26	Russet Queen	96	48	63	48
27	Early Market	90	12	19	48
28	Late Puritan	90	12	41	36
29	Todd Wonder	85	48	25	18
30	Eureka Extra Early	83	36	92	24
31	New Queen	77	.	63	48
32	Jeannie Dean	75	54	36	18
33	Irish Cobbler	70	24	66	.
34	Snow	70	24	26	24
35	Green Mountain	69	18	20	54
36	Empire State	61	36	97	
37	Green Mountain Jr	57	12	18	42
38	Vermont Gold Coin	52	48	20	54
39	Early Norther	51	42	47	18
40	Bovee	50	36	48	24
41	Reeves Rose	44	..	55	..
42	New Scotch Rose	42	54	38	30
43	Houlton Rose	41	48	48	.
44	Pan American	40	42	30	48
45	New Keystone	37	30	14	18
46	Rawlings Kidney (Ashleaf Kidney)	36	18	41	48
47	Early Hebron	36	18	46	12
48	Early Rose	30	48	24	12
49	Manistee	29	42	50	36
50	Burpee Extra Early	29	42	42	54
51	Early Ohio	25	18	26	24
52	Early Six weeks	24	12	20	54
53	Money Maker	23	6	55	..
54	White City	22	..	24	12
55	Improved Early Ohio	22	..	44	..

In addition to the test for 1915, a four-year average of a number of varieties is available and is here published:—

No.	Variety.	Marketable.			Unmarketable.		
		bush.	lb.	oz.	bush.	lb.	oz.
1	Dalmeny Hero	328	4	8	91	4	8
2	Dobbie Prolific	304	42	–	51	42	–
3	Table Talk	303	4	8	66	.	–
4	Dalmeny Regent	301	7	8	80	12	–
5	Brydon	294	48	–	64	21	–
6	Warrior (Davies)	271	9	–	53	54	–
7	Clyde	256	18	–	40	42	–
8	Scottish Triumph	255	45	–	77	—	–
9	Superlative	255	12	–	52	48	–
10	Brydon Beauty	253	33	–	58	1	8
11	Sir Walter Raleigh	250	15	–	36	34	8
12	New Chieftain	246	48	–	44	—	–
13	Up to Date	244	45	–	63	15	–
14	Green Mountain Jr	236	30	–	46	28	8
15	Todd Wonder	235	57	–	31	4	8
16	Houlton Rose	234	51	–	54	43	8
17	The Scott	233	45	–	65	27	–
18	Wee McGregor	233	28	8	113	18	–
19	Acquisition	228	15	–	70	24	–
20	Eureka Extra Early	227	42	–	82	27	8
21	Reeves Rose	226	3	–	65	27	–
22	Snow	224	24	–	42	21	–
23	Manistee	224	7	8	53	54	–
24	New Queen	223	18	–	66	33	–
25	Burpee Extra Early	215	52	8	46	12	–
26	Royalty	211	12	–	111	6	–
27	Nebraska	209	33	–	36	15	8
28	Early Norther	206	31	8	48	7	8
29	American Wonder	205	9	–	48	24	–
30	Green Mountain	203	46	8	65	40	8
31	Late Puritain	197	35	4	54	2	4
32	New Scotch Rose	196	37	8	48	7	8
33	Irish Cobbler	195	15	–	53	57	–
34	Jeannie Dean	194	58	8	63	31	8
35	Vermont Gold Coin	190	51	–	53	54	–
36	Early Market	187	33	–	31	21	–
37	Dreer Standard	186	24	–	22	55	8
38	Pan American	184	31	8	56	6	–
39	Rawlings Kidney (Ashleaf Kidney)	180	42	–	50	19	8
40	Russet Queen	178	45	–	79	45	–
41	Factor	177	6	–	40	43	8
42	Early Rose	147	57	–	45	39	–
43	Money Maker	143	—	–	50	—	–
44	Early Ohio	142	10	8	41	15	–
45	New Keystone	124	52	8	27	13	8
46	Improved Early Ohio	121	—	–	80	51	–

The attention of farmers and vegetable growers, in the vicinity of Ottawa, is called to these two tables. It will be noted that the commoner varieties, such as Green Mountain, Gold Coin and Dreer Standard are not in the lead, either in the four-year average or the one year list. In both tables the leading or heaviest yielding varieties correspond fairly well, indicating quite clearly that for this district these varieties are the most adaptable. That is, when the seed is grown from year to year in this district, these varieties appear to be the ones which can maintain their relative productiveness, while other varieties gradually grow less productive. This would indicate that certain varieties are better suited to certain localities, and, that because a variety does well in New Brunswick, it does not necessarily indicate that the same variety will do well at Ottawa, even if the same strain is planted in both places.

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Market gardeners and farmers of the Ottawa Valley would do well, therefore, to investigate the value of these few leading varieties, viz.: Table Talk, Dalmeny Hero, Dalmeny Regent, (Davies) Warrior, etc. Of course when annual importations of seed stock are made from natural potato districts, the importance of this selection of varieties to suit local conditions is not so apparent. This point will be further discussed in the following paragraphs.

VALUE OF IMPORTED SEED FOR THE OTTAWA VALLEY AND SIMILAR DISTRICTS.

For the past number of years it has been noted that potatoes grown from tubers produced at Ottawa have given smaller yields than imported seed of the same variety and strain. Not only has this been the case at the Experimental Farm, but it is also common among many of the vegetable growers and farmers of this district, although in some apparently favoured locations, there appears to be little, if any, advantage gained from the importation of seed. The reason for this apparent inability of the Ottawa district to produce seed potatoes of good vitality is not known, but a theory, which is the best to hand, is that it is a question of the over maturity of the tubers. In other words, it is considered that, on account of the potato tops drying up and withering relatively early in the season, as is generally the case at Ottawa, the tubers when dug, are fully matured and, although excellent for table use, are too mature and consequently have too little vitality for seed purposes.

Experiments are now under way to prove either the fallacy or the truth of this theory.

To give a clearer idea of the value of good seed, as compared with seed of poor vitality, an experiment was conducted at Ottawa this past season, with home-grown seed versus seed from the Experimental Station at Fredericton, N.B. Both lots of seed were originally from the same source, in fact the Fredericton seed came from Ottawa in 1913. Five varieties of potatoes were used, and the Ottawa seed of each variety was planted side by side with the Fredericton seed of the same variety. Both were planted in uniform land and treated in the same manner. The following table gives the results of this experiment:—

Variety.	Ottawa Seed.			Fredericton Seed.		
	Plants appeared above ground.	Marketable.	Unmarketable.	Plants appeared above ground.	Marketable.	Unmarketable.
		bush. lb.	bush. lb.		bush. lb.	bush. lb.
Bovee	18–VI	50 36	48 24	17–VI	92 24	61 36
Gold Coin	24–VI	39 36	17 36	17–VI	156 12	110 ..
Irish Cobbler	21–VI	59 24	46 12	17–VI	211 12	103 24
Green Mountain	24–VI	79 12	44 ..	17–VI	220 ..	118 ..
Carman No. 1	19–VI	.. ..	22 ..	19–VI	248 36	110 ..

In every case the Fredericton seed gave larger yields than the Ottawa seed, and the differences were in all cases very marked, leaving little doubt as to the greater vitality of the imported seed. It will also be noted that, in all cases but one, the growth of the imported seed was quicker than that of the Ottawa seed. Until a way has been devised, whereby the potato growers of the Ottawa Valley and similar districts can grow seed of good vitality, it will mean a great many dollars in the pocket of the average farmer to import annually his seed potatoes from some well known potato district. It would pay farmers and growers of a community to co-operate in the purchase of seed potatoes, thus enabling them to obtain a low price and also a

good quality of stock. Some years are much more favourable for the production of good seed than others, and in favourable years home grown seed gives very good results.

DIFFERENT DATES OF PLANTING TUBERS FOR SEED PURPOSES.

For a number of years it has been claimed that immature potatoes gave better results for seed purposes than tubers fully matured. In order to gain some definite information on this point, and also in order to devise a way whereby good seed potatoes could be produced at home, tubers were planted in 1914, at different dates, and the tubers from these different plantings sown in separate plots on the same date in 1915. Two varieties were used in this test, viz.: Empire State and Early Sunrise. The following table gives the results of the test:—

Variety.	Yield from tubers planted 10–VI–14.				Yield of plot from tubers planted 22–VI–14.				Yield of plot from tubers planted 3–VII–14.			
	Marketable.		Unmarketable.		Marketable.		Unmarketable.		Marketable.		Unmarketable.	
	bush.	lb.	bush.	lb.	bush.	lb.	bush.	lb.	bush.	lb.	bush.	lb.
Empire State	79	12	68	12	132	0	59	24	105	36	48	24
Early Sunrise	44	0	25	18	77	0	41	48	50	36	31	54

It will be noticed that, with both varieties, the seed from the earliest planting in 1914 gave the lowest yield in 1915, while the seed from the planting of June 22 in 1914 gave the largest yield in 1915. The planting of July 3 in 1914 produced seed which gave only moderately good results in 1915. This would appear to bear out the idea of immature seed and would also indicate that seed might be too immature. As further experiments are being conducted along this line, more data should be forthcoming in a short time.

SPROUTING OF SEED POTATOES.

An interesting experiment to show the value of sprouting seed potatoes, a method much employed in Great Britain and Ireland, was conducted this past season. The tubers were sprouted where there was light, thus they produced a short, stocky, green sprout, rather than a long, slender, white one, which would have been the result of sprouting in darkness. To sprout large quantities, the tubers are merely piled on the floor in a light, warm room, having the pile about two to three tubers deep. If left in this manner for some days, they will soon produce strong sprouts, which will not break off when the tuber is handled.

At planting time these tubers are then cut into large pieces and planted in the usual manner. A little care is necessary in handling the sprouted tubers, but the extra cost of handling is very slight. Sprouted sets should be hauled to the field in boxes, not in bags.

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The results from the sprouted seed, as compared with unsprouted seed planted the same date, show that earliness is greatly increased by sprouting. The following table gives the results of the test from one row, 66 feet in length. Diggings were made on July 29, August 5, August 12 and August 26:—

Variety.	Sprouted Seed yield at different dates.								Non-Sprouted Seed yield at different dates.							
	July 29.		Aug. 5.		Aug. 12.		Aug. 26.		July 29.		Aug. 5.		Aug. 12.		Aug. 26.	
	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.
Bovee	4	8	7		10		4	8	8		2		6		4	8
Early Rose	3	12	9		18	8	22		7		4		7	4	11	
Burpee Extra Early		4	3	14	2		3	8	0			5	0		1	8
Irish Cobbler	3	5	3	14	4	8	4	12	10		2	14	4	4	4	8
Early Ohio	1	8	7		10	12	12	8	13		2	2	6	4	8	8

An examination of this table will show that in every instance the sprouted seed gave much larger yields in the early diggings, than did the non-sprouted seed, thus showing that earliness can be greatly increased by sprouting the tubers before planting. It is believed that by sprouting main crop potatoes, the total yield of such varieties can also be greatly increased and experiments to ascertain this are now under way.

TOMATOES.

As new varieties and new strains of older varieties are continually coming on the market, it is essential that the variety testing of this crop be continued from year to year. Following will be found a table giving the list of varieties tested during 1915 and this is followed by a table giving a three year average of those varieties which have been tested for that length of time. As earliness in tomatoes is an essential point, the first table given is arranged in order of earliness, while the second table is arranged in order of total yield. Earliness is not based merely on the date of the first fruit, but is based on the yield of marketable ripe fruit for the first two weeks of the tomato season, this period being dated from the day that the first ripe fruit was picked from the plantation as a whole, and not dated from the first picking of the variety in question. Such a plan gives a clearer and more correct idea of earliness than if the plan of the appearance of the first ripe fruit was adopted. This is because of the fact that many of the varieties may show an odd ripe fruit very early, but will not continue to produce ripe fruit in any quantity.

Two new varieties tested at this Farm for the first time this year, are worthy of mention. One is Luther Burbank's new variety called Burbank Early, which, although not quite so early as one or two other varieties, is promising, both on account of earliness and also smoothness. Earliana, which for years has been one of the leading early varieties, has the great disadvantage of being very rough, so that when a smooth variety, almost as early, is found, it is worth recognition. Such a variety is Burbank Early.

The other variety mentioned above is John Baer. This variety has not proved nearly as early as it is claimed to be, but still can be classed as an early tomato, of good quality, and smooth, as grown by this Farm this year. However, it is not to be classed with Earliana, Earlibell or Burbank Early, for an early tomato.

Two other varieties which have been on the market for some time are worth mentioning, in fact, should be grown much more largely than at present. Earlibell, one of

these varieties, has proved, in tests here, for the past three years, an exceptionally early variety and also one of the smoothest and handsomest of tomatoes. It seems to be a variety that has been somewhat overlooked by many growers of early tomatoes. Bonny Best, the other variety, is an excellent mid-early variety, and it is surprising that it is so little grown by market gardeners. Its great feature is its smoothness, shape, colour and quality, rendering it one of the most marketable and profitable of tomatoes, lacking only in earliness. It is a fairly heavy yielder and should prove a good canning tomato.

Results of variety test in tomatoes, 1915. Best early varieties, based on yield of first two weeks of season. Five plants used for each variety:—

Variety.	Number days from sowing to first ripe fruit.	Yield of marketable fruit first two weeks.	Total yield marketable fruit.	Total yield unmarketable fruit.
		lb. oz.	lb. oz.	lb. oz.
Sparks Earliana	117	9–15	120–5	26–7
Earlibell	112	8–10	103–4	24–11
Alacrity	117	7–14	120–7	34–5
Burbank Early	118	7–7	95–3	45–15
Sunnybrook strain Earliana	119	6–15	122	28
Early June	121	6–2	98–9	25–9
John Baer	119	5–4	93–9	62–12
Northern Adirondack	117	5–4	107–2	63–1

Variety test of tomatoes 1915, arranged in order of total yield only. Five plants of each variety used in test:—

Variety.	Number of days.	Yield ripe fruit first two weeks.	Total yield marketable ripe fruit.	Total yield unmarketable and green fruit.
		lb.–oz.	lb.–oz.	lb.–oz.
Earliana (Langdon)	119	6–14	154–4	22–6
I. X. L. Prolific	117	4–6	130–3	52–10
Earliana Scarlet	119	3–15	112–9	20–4
Sunnybrook Earliana	119	6–15	122–9	28
Alacrity	117	7–14	120–7	34–5
Earliest of All	116	2–7	116–14	40–11
Prosperity	122	9	110–8	30–7
Bonny Best	119	4–9	108–15	36–3
Improved Earliana (Green)	119	2–13	107–12	42–12
Northern Adirondack	117	5–4	107–2	63–1
Earlibell	112	8–10	103–4	24–11
Chalk Early Jewel	119	1–6	100–5	75–11
Dobbie Earliest	117	2–9	98–13	29–1
Early June	121	6–2	98–9	25–9
Danish Export	114	2–14	98–5	59–5
Burbank Early	118	7–7	95–3	45–15
Round Scarlet Skin XXX	117	3–7	93–14	42–11
John Baer	119	5–4	93–9	62–12
Sparkling Dewdrop	116	2–2	89–15	54–4
First and Best	122	14	87–11	68–5
Crimson Cushion	119	3–9	86–4	32–12
Extra Early Wealthy	119	4–14	82–7	31–1
Dominion Day	119	3	78–7	76–11
Jack Rose	117	1–1	67–10	44–5
Blue Stem (King Edward)	119	4	65–10	126–8
Livingston Globe	122	9	59–6	88–8
Golden Ponderosa	122	5	40–9	60–12

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TOMATOES—THREE YEAR AVERAGES.

Following are lists of tomatoes giving a three-year average of results. The first list is arranged in order of earliness based on the first two weeks' production, while the second list is arranged in order of total yield.

TOMATOES—Three-Year Average—First Two Weeks' Yield, 1913-14-15.

Variety.	Marketable.	Unmarketable.
	lb.–oz.	lb.–oz.
Alacrity	9–	.....
Sparks Earliana	8–9	.....
Extra Early Wealthy	7–14	–1
Field Early June	7–11	–2
I. X. L.	7–8	—
XXX Earliest Round Scarlet Skin	7–7	–5
Northern Adirondack No. 1	6–9	–4
Earlibell	6–8	–6
Crimson Cushion	5–5	–2
Earliana Sunnybrook Strain	5–5	–2
Earliest of All	5–3	–4
Earliana, Northern Grown	4–13	–10
Jack Rose	3–11	– –
Bonny Best	3–6	.....
Dobbie Earliest	3–	.....
Dominion Day	3–	–1
Chalk Early Jewel	2–8	.....
First and Best	2–	–1
Prosperity	1–15	–2
Livingston Globe	1–2	–1
Blue Stem (King Edward)	1–	–1

TOMATOES—Three-Year Average, 1913-15. Arranged in order of Total Yield.

Variety.	Number days from sowing to first ripe fruit.	Yield first two weeks.		Total yield.	
		Marketable	Unmarketable.	Marketable	Unmarketable.
		lb.–oz.	lb.–oz.	lb.–oz.	lb.–oz.
Sparks Earliana	123	8–9	.....	77–11	30–10
Alacrity	123	9–	.....	75–4	35–6
Earliana Sunnybrook Strain	125	5–5	1–2	75–1	23–6
Earliana Northern Grown	124	4–13	–10	73–	29–
I. X. L.	122	7–8	.....	72–14	33–4
Selected Earliana	123	3–11	.....	72–13	24–5
XXX Earliest Round Scarlet Skin	124	7–7	–5	67–3	18–13
Sparks Earliana Selected	125	6–14	–2	64–12	33–14
Field Early June	124	7–11	–2	63–9	19–15
Earliest of All	123	5–3	–4	63–	30–4
Prosperity	126	1–15	–2	61–14	27–5
Northern Adirondack No. 1	125	6–9	–4	61–5	37–15
Earliana	130	7–3	–1	61–4	20–9
Extra Early Wealthy	124	7–14	–1	58–3	32–1
Bonny Best	123	3–6	.....	57–14	28–15
Earliana	133	3–6	–1	58–14	30–8
Crimson Cushion	129	5–5	–2	57–9	28–
Earlibell	121	6–8	–6	56–9	33–7
Improved Earliana (Green)	128	2–10	.....	55–4	36–2
Johnson Jack Rose	129	3–11	.....	51–13	46–14
Earlibell	120	4–2	.....	52–13	35–8
Chalk Early Jewel	125	2–4	–7	58–2	48–5
Dobbie Earliest	123	3–	.....	48–14	35–7
First and Best	132	2–	–1	48–2	52–13
Chalk Early Jewel	128	2–8	.....	47–15	42–8
Dominion Day	131	3–	–1	43–6	45–13
Chalk Early Jewel	124	1–11	–1	40–5	42–2
Blue Stem (King Edward)	128	1–	–1	36–2	61–9
Livingston Globe	130	1–2	–1	33–14	44–2
Chalk Early Jewel	129	1–6	.....	33–	51–8

PRUNING AND STAKING TOMATOES.

Last year mention was made of the results obtained from pruning tomatoes to a single stem and tying to stakes. It was pointed out that by following this practice, fruit was obtained earlier, and also that there was a better quality of fruit. Experiments this year prove the same to be true again.

In the 1915 experiments, two varieties of tomatoes 25 plants of each were used, viz.: Bonny Best and Earliana. The methods of training were as follows:—

1. Plants four feet apart each way, lying on the ground, not pruned.
2. Plants in rows four feet apart, with plants two feet apart in rows, trained to a single stem and tied to a stake.
3. Plants 2 x 4 feet apart, trained to a single stem and tied to a stake with one-half the foliage removed.
4. Plants 2 x 4 feet apart, trained to a single stem and tied to strands of wire carried on posts.

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5. Plants 2 x 4 feet apart, trained to two stems and tied to a stake

The results from these different methods of training follow:—

Training Experiments with Bonny Best.

How trained.	Yield of ripe fruit first two weeks, per 100 sq. ft.				Total Yield ripe fruit per 100 sq. ft.			
	Marketable.		Unmarketable.		Marketable.		Unmarketable.	
	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.
2 by 4 feet, tied to stake 1 stem, one-half foliage removed	8	12	..	..	105	4	4	15
2 by 4 feet, 1 stem, tied to wire	4	15	..	..	111	11	6	9
2 by 4 feet, 1 stem, tied to stake	2	8	..	..	130	15	8	9
2 by 4 feet, 2 stems, tied to stake	1	6	..	..	197	2	7	14
4 by 4 feet, on ground	..	8	..	..	99	9	41	4

Earliana, Sunnybrook Strain.

How trained.	Yield of ripe fruit first two weeks, per 100 sq. ft.				Total Yield ripe fruit per 100 sq. ft.			
	Marketable.		Unmarketable.		Marketable.		Unmarketable.	
	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.
2 by 4 feet apart, tied to stake, 1 stem, ½ foliage removed	5	8	..	..	96	9	2	4
2 by 4 feet, apart, 1 stem, tied to stake	4	4	..	..	87	10	2	1
2 by 4 feet, apart, 1 stem, tied to wire	2	13	..	..	97	7	1	7
4 feet apart each way, on ground	1	13	..	..	95	12	23	12
2 by 4 feet, apart, 2 stems, tied to stake	..	7	..	..	122	14	11	..

It will be noticed that in both cases the vines pruned to one stem, tied to a stake, with one half the foliage removed, gave the greatest amount of early fruit. On the other hand, the vines trained to two stems, in both cases, gave the greatest total yield of fruit.

The expense of staking and tying is not nearly as great as a grower would at first think, and for a person growing early fruit for market, is offset by the increased yield of early fruit. In addition, the fruit from the staked vines was better shaped, and could be classed as a higher grade. Another feature is the increased number of plants that can be grown per 100 square feet, thus increasing the yield per square foot by this close planting.

As numerous inquiries are received by this Department, asking about pruning tomatoes to a single stem, the following illustration will be of use to the uninitiated.

GREEN PEAS.

A comparison of the relative advantages of a succession of varieties of different seasons with the same variety planted at intervals of a week apart for four weeks.

Four varieties of peas were used in the above experiment, viz.: Gradus, McLean Advancer, Stratagem and Thos. Laxton. One hundred feet of each of the four varieties was planted on the eighth day of May. Following this planting were three plantings of Thos. Laxton made on the 15th, 22nd, and 29th of May. The object of this experiment was to see whether or not the three varieties of different seasons, if all planted the same date, would give as good a continuation of green peas as the Thos. Laxton if it were planted at intervals of a week apart for the four weeks.

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From the results obtained, both Gradus and Thos. Laxton planted on the 8th of May, gave green peas on the 8th of July. The Gradus gave green peas from the 8th to 22nd of July; McLean Advancer from the 16th to the 19th of July, Stratagem from the 23rd of July to the 2nd of August. Therefore, for these three varieties of peas, all planted the same day, the season commenced the 8th of July and continued until the 2nd of August, with pickings on the 8th, 14th, 16th, 22nd, 23rd, 26th, 29th, 30th of July and 2nd of August, making nine pickings in all, covering a period of twenty-five days.

As before stated, the Thos. Laxton, planted on the 8th of May, gave its first picking on the 8th of July and continued pickings until 24th of July. Thos. Laxton planted May 15 was in season from July 15 to July 24. Thos. Laxton planted May 22 yielded from July 15 to July 26, and Thos. Laxton planted May 29 yielded from July 20 to July 28, making a season for these four plantings at different dates from July 8 to July 28, or in other words, a season covering a period of twenty days, with nine pickings, viz.: July 8, 15, 16, 20, 21, 23, 24, 26 and 28.

Comparing the results from the two different lots, it appears that both gave the same number of pickings, but that the three varieties of different seasons gave a longer season by five days than did the four plantings of Thos. Laxton. Another interesting point brought out was that the earliest planting of Thos. Laxton gave the largest yield of the four plantings, the second planting the second largest yield, the third planting the third largest yield and the last planting the smallest yield. From all this it would appear, therefore, that to obtain a succession of green peas, with the maximum yield and the least trouble, it is better to plant three or more varieties of different seasons at the same time than to make a continuous number of plantings extended over a long period.

GREEN BEANS.

A comparison of the relative advantages of a succession of varieties of different seasons with the same variety planted at intervals of a week apart for four weeks.

This experiment is very similar to the one referred to under green peas, the object of the experiment being to decide whether or not the same variety should be planted at intervals to obtain a succession of crop, or whether a number of varieties of different seasons would give this result in a more satisfactory manner. In the case of green peas, the result of the experiment showed that a number of varieties of different seasons, planted on the same day, gave a longer succession of crop than the one variety planted at intervals. In this experiment the results are very similar. Four varieties of beans were used, viz.: Stringless Green Pod, Extra Early Red Valentine, Refugee or 1,000 to 1 and Round Pod Kidney, the Round Pod Kidney being the one planted at intervals of a week apart for four plantings. The first three varieties were planted on May 25, as was also the first planting of Round Pod Kidney. Subsequent plantings of Round Pod Kidney, were made on June 1, June 8 and June 15. The first green beans were picked from Stringless Green Pod on the 19th of July. The three varieties of different seasons gave pickings from July 19 to August 31, a season of forty-three days. The four plantings of Round Pod Kidney gave the first picking on July 28 and continued in season until the 3rd of September, a season of thirty-five days. This shows a longer season in favour of the three varieties, their season being longer by eight days. In matter of yield, the Round Pod Kidney, during its early plantings, gave the largest yields, but the later plantings fell off very materially in this respect. This experiment goes to show, therefore, that for a continuous crop of string beans, it is far better to plant three or four varieties of different seasons on the same date, than to rely on successive plantings of a single variety.

OTTAWA.

VEGETABLE WORK UNDER GLASS.

Since the erection and occupation of the new greenhouses, the Horticultural Division has devoted considerable time to the growing of some of the more important greenhouse crops, with a view of ascertaining the kinds and varieties most suitable for greenhouse culture, and also to ascertain, if possible, which crops are the most lucrative for a greenhouse grower.

Around Ottawa it seems that the owners of greenhouses devote the most of their time to growing lettuce, which, although an easy crop to handle and a moderately profitable crop at times, is by no means the only greenhouse crop they could handle at a profit, in fact to grow a greater variety of crops would in most cases bring greater returns. The reason that can be suggested for this lack of initiative on the part of the growers is that there seems to be an idea abroad that such crops as tomatoes and melons cannot be grown at a profit during the off season of the year, and thus the growers seem loath to depart from the old fixed ways. In the following paragraphs a report on the results of growing tomatoes will be found. More work has been done with tomatoes than with any other crop, it having been found to be one of the most profitable crops for greenhouse work. For the benefit of any person contemplating the growing of this crop under glass, a short article on the growing of the same is attached.

EXPERIMENTS WITH TOMATOES UNDER GLASS.

GROWING TOMATOES IN POTS VERSUS GROWING IN BENCH AND SOLID BEDS.

An experiment to determine the relative value of the pot culture of tomatoes in the greenhouse as compared with either bench or solid bed culture was conducted this past season. The pot culture method has long been recognized as having one advantage over the bed method. The advantage of the pot culture is that after the crop has passed its prime the plants may be removed to another house or may be packed more closely in the same house to ripen any green fruit that may remain on the topmost trusses. This would allow of the use of the vacated space much earlier than would be the case if the plants were directly planted in the bed or bench, for in the latter case it would be necessary to permit the plants to occupy the entire house until practically the whole crop was ripened. Of course greater expense is coupled with the pot culture method, and, as will be seen from the following results, a lessened crop is also the result. The conclusion arrived at, therefore, is, that to obtain a maximum crop of tomatoes, the bed and bench method is superior to the pot method, but that a moderately good crop of fruit can be obtained by the latter method, and that it may be advisable, when pushed for room, to resort to this method of growing tomatoes in the greenhouse.

How and where Grown.	Yield of 108 square feet in each case. Lb.	Oz.	
Planted in solid bed..	161	1·5	
Planted in side bench..	118	5	279 lbs. 6½ oz. for planted method.
Pot culture in solid bed..	74	3·5	
Pot culture in side bench..	127	8	202 lbs. ½ oz. for pot culture method.

GROWING TOMATOES UNDER GLASS.

There are few crops that can be grown at greater profit, by the greenhouse man, than tomatoes. This crop will readily respond to careful and proper treatment, and, although a trifle difficult to handle at times, it can readily be handled by the average grower. For the greenhouse trade a smooth, medium sized, firm, meaty tomato is desired. In this country the consumer is still demanding a tomato slightly larger

than most of the English forcing varieties. On this account many of the most prolific and smoothest tomatoes are not grown by Canadian growers. From the experience of this Farm, taking everything into consideration, Bonny Best and Livingston Globe are two of the best varieties for forcing purposes.

With good care a grower of greenhouse tomatoes may expect a crop ranging from two to two and one-half pounds per square foot. As tomatoes out of season have averaged, at least, 20 cents a pound for the past two years, this means a return of 40 to 50 cents per square foot of bench space. A crop of tomatoes, planted during the latter part of summer, will give fruit for the Christmas and holiday market. The crop at this season of the year generally occupies the house for about fifteen weeks, so that 40 to 50 cents per square foot for a fifteen or sixteen-week period would be considered a profitable return.

The seed is sown in flats and the young plants pricked off into pots as soon as they are large enough to handle. They should not be left in the seed flat for too long a period, otherwise they will become too leggy and soft. To have first-class results, stocky, strong plants must be grown from the start. The young plants are generally left in the second flats for about a month, after which they should be potted in four-inch pots and held there for about two or three weeks. The length of time the plants are held in any one stage depends very largely upon the weather conditions. During dark, muggy weather, the young plants are liable to get soft and leggy, so will necessarily have to be held back a little longer until they become more stocky in growth. From the four-inch pots they are transplanted directly to the beds or benches, being planted in rows two feet apart, with the plants eighteen inches apart in the rows.

The soil for tomato culture should not be made too rich in nitrogenous materials. If too large a supply of nitrogen is present, soft and too rapid growth will result. A moderately light, loamy soil is best suited for this crop and should be mixed with about one-fourth the amount of well rotted manure, to which is added a small quantity of either bone meal or acid phosphate. About one part of bone meal or phosphate to one hundred parts of soil is sufficient.

Whether or not feeding will be necessary will depend very largely upon the condition of the plants. In some cases feeding will be necessary, but in this respect care must be exercised. Liberal feeding with liquid manure is not recommended, as it produces too soft a growth. If feeding is found necessary, use bone meal or acid phosphate with a moderate quantity of potash or wood ashes. Feedings should be light and frequent, rather than heavy and seldom. If plants are being grown on raised benches with only a few inches of soil, feeding will need to be far more frequent than if the plants are in a solid bed.

Although a tomato crop will require considerable water, the watering must not be too frequent. Too frequent watering, which tends to keep the house damp, induces disease and soft growth. The top inch or two of soil may be allowed to appear dry, so long as the roots are in moist condition. The watering of tomatoes is done at long intervals, a good heavy watering being given each time, after which the plants are let go until they really are in need of another watering.

The best method of training in the greenhouse is to train to a single stem. Tomatoes grown to a single stem have proved greater yielders per square foot than plants grown to two or three stems. All laterals, therefore, are pinched off as soon as they appear, and the single stem tied to wires or bamboos, themselves tied or supported by parallel wires running over the bed at a height of five feet.

One of the most important operations in connection with tomato culture is the maintenance of a proper temperature and proper ventilation. Few crops are quite so exacting in their demands along these lines as the tomato. A night temperature of 58 to 62 degrees F., accompanied by a day temperature of 70 degrees to over 80 degrees when the sun is up, is about correct. This temperature, though, must be

accompanied by purity of air, for in a hot, moist or close atmosphere, tomatoes prove a failure. They desire warm, dry, bracing air, and, during the dark days of early winter and late fall, the question of proper ventilation is all important. Especially after the plants are in blossom is it necessary to have the air dry, otherwise pollination is a difficult task. To aid the setting of fruit as much as possible, hand pollination in some form should be resorted to. For this purpose a small downy feather or rabbit's tail, tied to the end of a light stick, is used. By simply touching each open flower with this apparatus much pollen is released and applied to the pistil. During the early winter or late autumn it is exceedingly difficult to get a good set of fruit without the adoption of hand pollination. Many growers merely tap the wires or stakes to which the plants are tied, but, during dark weather especially, this is not sufficient.

As fungous diseases of the tomato crop are quite easily prevented by proper ventilation and a dry atmosphere, little trouble should be experienced in that connection, if proper attention is given to those points. If, however, an attack of mildew gets a hold on the plants, it should be checked at once by spraying with any of the ordinary fungicides. Bordeaux mixture is excellent for this purpose, but should be used rather weaker than for other crops, a 3, 4, 40 mixture, when well made, is quite safe. This is made by using 3 pounds of copper sulphate, 4 pounds of lime and 40 gallons of water.

For the control of white fly, which will often be found on a crop, fumigating with hydrocyanic acid gas is resorted to. For this purpose use half an ounce potassium cyanide (98 per cent pure), 2 ounces sulphuric acid, and 4 ounces of water to 4,000 cubic feet of space. The acid and water are placed in a saucer and the cyanide dropped in, after which a speedy exit should be made by the operator, for the gas is a deadly poison. The foregoing formula has been found sufficiently strong for the new greenhouses at this Station, but where a more open type of house is used, such as the King Construction house, it might be found necessary to use as much as 1 ounce of cyanide to 4,000 cubic feet. If used in too concentrated a form, serious burning will result, so each grower should be on the safe side at first until he has ascertained the correct proportions for his house.

CAULIFLOWERS UNDER GLASS.

Two trial lots of this vegetable have been grown in the greenhouses in order to determine whether or not this crop could be considered profitable for the average grower. In both cases, the results obtained showed that, although a large number of good heads could be obtained, it cannot be considered a profitable crop for the average man. The returns per square foot of space used are considerably lower than the returns from a crop of tomatoes.

For any person desiring to grow cauliflowers it may be added, it has been found that Extra Early Snowball and Dwarf Erfurt are two of the best varieties for greenhouse work.

BEANS UNDER GLASS.

Two crops of string beans have been grown in the greenhouses, but in both cases the results were anything but satisfactory. It does not seem possible to obtain a paying crop from this vegetable, although different varieties were used and different cultural methods tried.

OTTAWA.

IRRIGATION FOR THE VEGETABLE GROWER.

A system of overhead irrigation was installed at the Central Farm during the season of 1915. The whole vegetable area of the Horticultural Division, comprising some 6·8 acres, was completely equipped with the plant. Although no information is available regarding the benefits to be derived from irrigation, some suggestions are here presented.

Owing to the lateness of the season before the installation was completed, it was impossible to conduct any comparative test of the merits or demerits of irrigation, although the plant was successfully operated several times during the summer.

METHOD OF INSTALLATION.

The whole area under irrigation comprises 6·8 acres, and the system is so arranged that the whole area can be irrigated at one time. This demands a water supply of 320 gallons per minute after all friction heads have been deducted. As the field is located 1,600 feet from the source of water supply, a main pipe line of 1,600 feet of 4-inch galvanized iron pipe was the first step involved. Galvanized pipe was decided upon for underground work on account of its longer life than ordinary black iron pipe. Cast-iron pipe would, of course, have been better still, but, owing to its high cost, it was not considered. Had it been considered advisable to operate only one-third or one half the system at one time, the main pipe line could have been reduced to a 2-inch or 2½-inch pipe, with a consequent reduction in the cost of installation.

In addition to the main pipe line, another underground line was installed through the centre of the field. This is known as the feeder line, and every 50 feet along this line, 1¼-inch risers or uprights are attached. These risers supply the water for the nozzle lines. This feeder line is 775 feet in length and consists of 400 feet 3-inch pipe, 225 feet 2½-inch and 150 feet 2-inch pipe, the 3-inch pipe joining directly to the 4-inch main line. The underground system is not put below frost line at every point. From the water supply to the field the 4-inch line was made to run down hill a little and was put about two feet below the surface. Drain cocks were installed at both ends of the line, so that no water would be left in the pipes over winter. The feeder line, owing to a sharp hill in the field, slopes in two directions, and is drained from both ends. Care was taken, of course, that no pockets remained in the system to hold water over winter. The overhead system is installed in as permanent a manner as possible, that is, the nozzle lines are carried on galvanized iron posts set in cement, and are carried to a height of seven feet over the highest hillock. This permits a team of horses to work under the system of nozzle lines, without interference. These nozzle lines are directly attached to the risers and radiate from both sides. Each line is a separate unit in itself, that is to say, each line has its own turning union and shut-off and can be turned in any direction or shut off or put on without interfering in any way with the other lines. This makes 32 separate working units in the whole system. Each separate nozzle line is 190 feet long and consists of 60 feet of 1-inch and 130 feet of ¾-inch galvanized pipe. These overhead lines are supported by 1-inch galvanized iron posts placed every 15 feet and set in cement. The nozzle lines are 50 feet apart, so that by turning each line over, it is made to cover a 50-foot space, as the spray reaches 25 feet on each side of the nozzle line. The Skinner nozzles are placed every four feet on the nozzle lines and are in a perfectly level and straight row. This system is, of course, the most permanent and hence the most expensive method of installation. For a market gardener, desiring a somewhat cheaper installation, the overhead pipe lines could be carried on wooden posts resting on blocks of wood, or driven deeply into the ground. This would reduce the cost considerably. Another point is that already referred to, namely, that a smaller area could be installed at a much lower cost per acre, on account of the smaller feed line necessary.

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The cost per acre is quite a factor and probably much greater than the average market gardener would care to expend on his field. It must not be assumed, however, that this system cannot be installed in a cheaper manner, for, as already mentioned, savings in equipment can be effected in one or two instances.

Had the overhead system been carried on 2 by 3 wooden posts, creosoted and driven into the ground, the cost for posts would have been not more than fifty dollars, whereas the galvanized iron posts cost $254.60. This one alteration would thus reduce the cost by $204.60. An additional saving is also made by using wooden posts in that the pipes are set in grooves or notches in the top of the post, thus doing away with the patent hangers and thereby saving $96 more. As the stakes are driven into the ground, no cement is necessary, as was the case with the iron posts, so that a further saving of $35.75 is here effected. Thus by simply using creosoted wooden uprights instead of iron posts, a saving of $336.35 could be made, without impairing the efficiency of the system whatsoever at the outset though the wooden posts would be much less permanent.

In most estimates or statements regarding the cost of installing an irrigation system, no estimate is allowed for leading the water to the field to be irrigated, thus many people claim that it costs from $125 to $200 per acre to install the overhead system of irrigation. These estimates assume that the water is, of course, close to the field and that it is only necessary to connect up with the main pipe line at close range. Such statements are rather misleading to the average grower, who naturally thinks that all items are included in these figures. In order, therefore, to present this question of cost in all its different aspects and to prevent the reader from gaining a false impression regarding the expensiveness of irrigation installation, assume that a two-acre field is to be irrigated, and that an estimate of the cheapest possible installation is needed. The cost of leading the water to the field will not be taken into consideration since that is a matter which will vary considerably with local conditions. Assuming that the field to be irrigated is 380 feet by about 300 feet in area, or in other words, about a two-acre field, to properly irrigate such a field, six lines of pipe, each 50 feet apart will be required. Each line would be 380 feet long, but should be divided at the middle into two separate units, each 190 feet in length. To feed this system, an underground pipe consisting of 150 feet of 2½-inch pipe and 150 feet of 2-inch pipe would be required. As there are several optional systems or plans of installation, each will be considered separately. The options are:—(1) galvanized pipe throughout, nozzle lines carried on galvanized uprights set in cement, (2) galvanized pipes above ground, black iron pipe underground, lines carried on iron posts, (3) galvanized pipe above ground, black iron pipe underground, lines carried on wooden posts, (4) galvanized pipes above ground and underground, lines carried on wooden posts. Of these options, No. 1 is the most permanent. Those options in which black iron pipe is used beneath ground would probably be somewhat shorter lived, but how much is not known. It may be that the difference in life is not enough to warrant the use of galvanized pipe. In those options in which wooden posts are used, if the posts are creosoted their life will be long enough for all practical purposes, the only objection to this plan being the clumsiness of the structure.

Before installing any system of irrigation, the question of water supply should be given serious consideration. The supply should be such that at all times sufficient water will be available to give the area a good drenching. An application of one-half inch per acre is considered a good application at one time. During an exceedingly dry spell, it will probably be necessary to give two such applications a week, or perhaps more. Some authorities always give an inch at each irrigation, claiming that one heavy irrigation is much better than several lighter ones. An acre inch, that is, enough water to cover an acre one inch deep is 27,154 gallons. This does not allow for any evaporation. This does not mean, of course, that this much water will actually

cover an acre of soil one inch deep, for the water will naturally seep through the particles of earth and be absorbed. It means that 27,154 gallons would cover an acre one inch deep, providing there was no seepage or evaporation. If ten acres were being irrigated, the amount of water required would be 271,540 gallons. At thirty pounds nozzle pressure, one acre of Skinner irrigation system will deliver about fifty gallons per minute, so that to deliver an acre inch the system would require between nine and ten hours. The importance of a water supply will thus be recognized. In addition to the matter of quantity of water, the question of pressure must also receive consideration. This may be obtained by a high power pump, or by using a storage tank on a high elevation with a lower powered pump supplying this tank. The pressure at the nozzle lines should be, at least, thirty pounds, if the lines are put fifty feet apart, and may be correspondingly lower if the lines are put closer together. The static pressure at the tank, or the actual pressure at the pump, must, therefore, be considerably greater than this, in order to overcome friction and still have thirty pounds pressure left at the nozzle lines. All these points must be considered carefully before any installation is made and any person considering the installation of an irrigation system should give all the necessary data to the manufacturers, who will, in most cases, be ready to give expert assistance in figuring up the best source of water supply for the system.

Whether or not it will pay a grower to irrigate depends upon local conditions. There is no doubt but that under certain conditions irrigation will pay well. At the Central Farm last season the new strawberry plantation was practically saved by irrigation. During the early part of June the hot winds would dry out the upper portion of the sandy soil and blow it over the young plants, almost burying them beneath hot sand. By the use of the irrigation plant, this was overcome so that the plantation went into winter quarters with very few misses and an excellent growth of runners.

EXPERIMENTS IN GROWING VEGETABLE SEEDS AT THE CENTRAL EXPERIMENTAL FARM, OTTAWA, IN 1915.

There is no doubt but that ever since the first settlements were established in Canada, about three hundred years ago, vegetable seeds have been saved from home-grown plants, and there are now many Canadians who grow their own corn, tomato, melon, bean, and pea seed, as well as other kinds; but comparatively few are growing celery, beet, cabbage, cauliflower, and onion seed, as the seed of these vegetables is not so easily grown.

The commercial production of vegetable seeds is limited to a very few persons in Canada, and the kinds of vegetable seeds grown commercially are few in number.

After the war broke out it was realized by the Government that there might, before long, be a decided shortage of those seeds of which France and Germany furnished a large proportion, and the time seemed opportune for encouraging Canadians to grow more seed themselves. A bulletin on "Growing Field Root, Vegetables and Flower Seeds" (Bulletin No. 22, Second Series) was, therefore, published by M. O. Malte, Ph.D., and W. T. Macoun, Dominion Horticulturist, in which information was given on the growing of certain kinds of seeds. Experiments were also begun on the Central Farm, and the results obtained are given in the following pages.

VEGETABLE SEED GROWING.

As most of our popular vegetables are biennial plants, that is, require two years in which to produce seed, it is necessary in this cold climate to resort to some means of holding the yearling plants over the winter. Last year at the Central Farm beets, carrots, cabbage, and celery were successfully carried through the winter season by storing in pits in the open, while onions were carried through in a root cellar.

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Although the method of pitting adopted was probably not the best, improvements have been made this present season and a description may be of value.

A hole about 2 feet in depth, and as large as was needed, was excavated on a sloping piece of ground. Carrots and beets were placed in rows in this pit and covered with soil. Cabbages were also heeled in alongside the roots, being buried in soil up to the head, in a single layer or tier, and celery in a like manner, the latter being almost completely buried in soil till only the tips showed. Both cabbage and celery were placed in nearly upright positions. Over these vegetables a heavy layer of dry straw was placed, then a covering of boards, followed by tar paper and about 1 foot of earth. This was hardly sufficient covering to keep out frost, but most of the plants thus stored grew and produced seed.

Beets and carrots all came through without being injured at all and with very little loss due to rot. Some of the roots had started growth when taken from the pit and others were perfectly dormant. It was observed during the summer that the perfectly dormant ones, in every case, did better than those which started growth.

Cabbage also was free from rot and injury in most cases. Many of the heads, however, had put forth considerable growth, which proved injurious before the season was over, as the top grew too fast, before the roots had obtained a sufficient hold to supply them with food and moisture properly, the result being that when dry weather came they all drooped and died.

The celery in nearly every case was all gone with rot, excepting the heart, and was a sorry looking mess when planted, but despite this a better stand of celery was obtained than of any other crop. One variety, "Winter Queen," did not lose a single plant out of seventy-eight planted.

Onions, of course, were all in good condition, so that there is nothing special in this instance to be reported.

This season the roots have been pitted by themselves in a pit constructed as that shown in the illustration (fig. No. 1), while the cabbage and celery have been pitted in a similar manner to last year, with the exception that a ventilation shaft has been provided and alternate layers of straw and earth take the place of tar paper and boards, and will afford a better protection against freezing.

SELECTION OF THE SEED STOCK.

In order to obtain the best seed, seed which will produce first class vegetables, it is very essential that careful attention be paid to the selection of the vegetables the previous year to their bearing seed. Type is very important, and the grower must be acquainted with the varieties he is attempting to grow, in order that he may have a fixed type in his mind at harvest time in the fall.

From experience gained this past season, the following recommendations are made:—

Beets.—In harvesting beets for seed purposes they should first of all be pulled by hand, tops and all, then those roots which are full sized and true to type, selected and placed to one side, after which they may be topped, taking care not to cut too close to the crown buds, from which will start the seed bearing stalks of the following year. The roots of the beets should be left intact and not trimmed as for table use. When thoroughly dry they may be hauled to the pits, carefully, and piled in position for storage, or, if desired, they can be handled in bags, which is, perhaps the more desirable method of storing them, especially in smaller quantities.

Carrots.—Carrots are handled in a similar manner to beets, care being necessary to select only the roots that are true to type. If small or immature roots are selected the progeny will soon be of an inferior class.

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Cabbage.—Cabbage should be pulled root and all, and the outside leaves removed. Care is necessary in handling, to avoid the breaking of the long tap-root.

Celery.—Celery should be lifted with the roots left on, and may be immediately heeled in in a shallow pit, care being taken to remove any diseased stalks and also to throw out any heads that are not true to type.

Onions.—In selecting onions for seed too much care cannot be given to type. Do not use any that show signs of producing big necks, or thick-necked onions. It would seem that vegetable growers could do much to improve their onion crop by growing their own seed with a rigid system of selection. All growers know how much a good crop of onions depends upon the source of the seed, probably more so than any other vegetable grown.

PLANTING.

The land to be used for seed production was thoroughly ploughed in the spring and heavily manured, and the plants set out as soon as possible in early spring. The distances recommended in the different varieties are as follows:—

Cabbage, earrots and beets should be planted in rows 30 inches apart, with the plants two feet apart in the rows. This may seem rather close, but if placed too far apart the plants are apt to lie down when loaded with seed, whereas if they are fairly close together each will support the other to a large extent. In the case of celery the rows should be the same distance apart, but the plants only one foot apart in the rows, while onions are placed only 6 inches apart in rows 30 inches apart.

Constant cultivation is necessary at the beginning of the season, especially, but in the case of a slow maturing seed like celery, cultivation may be discontinued in late summer to hasten the maturity of the seed.

HARVESTING AND CLEANING.

The different vegetables require different methods of harvesting, each one being a problem in itself. Probably the simplest crop to handle is that of beet, this vegetable ripening its seed nearly all at once. In harvesting beet seed it is only necessary to remember to cut it in the green stage, just as it is commencing to turn brown. In order not to jar the plant any more than is necessary it should be cut with a sharp spade just at the ground, thus removing the top part of the root with the stalks attached. The man cutting may be followed by another who ties the cut seed stalks into bundles, he again is followed by a man with a spade who cuts off the attached piece of root, thus leaving the stalks tied in bundles ready for stooking. The stooks should not remain in the field many days before they are threshed, as it is considered better to thresh them slightly in the green stage and allow the seed to ripen after threshing. If only small lots are being handled, a flail will serve for threshing, if large lots, an ordinary threshing machine serves admirably.

The seed may be fairly well cleaned by an ordinary fanning mill, but this will not take out all sticks, etc., although grading the seed fairly well. To remove the sticks the seed is put over a revolving endless belt which is on a steep incline, the seed rolling down the belt to a box, while the sticks and dirt are carried on over the other end. Fig. 2 shows the arrangement in use by the Horticultural Division. By using the electric fan the dust and light seed are blown out before it strikes the belt, thus giving a nice clean sample of seed. The apparatus is one that can be readily made by any person who is at all handy with tools and serves excellently for fairly large lots of seed.

Carrots.—Carrot seed is not as easily harvested as beet seed. Several pickings are necessary in the case of carrots, as the heads all ripen at different intervals, extending

over a long period. The ripened heads may be clipped off from time to time when necessary and gathered in baskets and stored awaiting threshing. The threshing and cleaning of carrot seed is a much more difficult task than handling beet seed. In order to separate all the seed and to have all the fine hairs and edges broken off, it should be thoroughly dry and ripe before threshing and should only be threshed on a cool, dry day. Probably two threshings will be necessary to obtain well rubbed seed. If small lots are being handled the seed may be separated in a bag by beating with a stick. The ordinary fanning mill will clean and grade with the exception of removing the sticks which it seems impossible to get rid of with ordinary fanning mills and separators.

Celery.—Although celery seed does not all ripen together, there being blossoms still unopened at harvest time, this year's experience goes to demonstrate that it may be successfully cut on the slightly green side, before a great deal of the early seed has matured sufficiently to drop off. This appears to be a more practical way of handling than by making several cuttings, for in the case of celery it is very tedious and expensive work to gather small lots of seed as it ripens. Of course it will probably be necessary to go over the plants once to get the earliest seed if one wishes to save it, otherwise it will shell before the plant has sufficiently matured the major part of its crop. When cut, the heads, or stalks, as the case may be, should be handled very carefully, and, if possible, should be handled on sheets, for celery seed, when dead ripe, and there will always be in a portion in that stage, shells very easily. As celery seed is very expensive a grower could afford to give special attention to these details. When cut green, the stalks should be placed in a drying shed to dry before shelling. The shelling is more difficult than with most seeds for there is always a considerable portion which will adhere to the heads unless rubbed quite firmly. This, no doubt, is the fairly green seed, which when ripened inside does not shell as easily as when ripened in the open.

An experiment in which equal quantities of Winter Queen celery were cut on the green side and allowed to ripen in the field, and gathered at intervals, gave results in favour of cutting green. The green cut plants gave a yield of 2 pounds 7½ ounces of No. 1 seed from thirty-four plants, while that cut ripe gave a yield of 1 pound 14½ ounces from 34 plants. The ripe seed gave a fifteen day germination test of 72 per cent, while the green cut plants germinated 93 per cent in the same time.

The seed after being separated from the stalks was put through a Clipper fanning mill, which did excellent work in cleaning the seed.

Cabbage.—From evidence obtained this past season, cabbage plants which are perfectly dormant do much better in the long run than those which have thrown up a seed stalk while in the pit, the former appearing to be more thrifty and yielding larger quantities of seed. It is difficult to decide when to cut cabbage plants like most of the other vegetables. The early bloom is ripe before the mid-summer bloom has set seed, so that no matter how the grower works it there is always an apparent loss at harvest time. At the Central Farm this year the plan of cutting off the earliest pods was adopted, while the later ones were left until harvest time when the whole plant was harvested, as soon as the majority of the seed pods had commenced to turn yellow. The seed in a cabbage pod commences to darken and harden before the pod dries up, so that if cut at the stage mentioned above the bulk of the seed will mature in the pod and the loss due to shelling will be greatly reduced. The cabbage seed may be threshed by flail or by machine, and a Clipper mill will do excellent work at cleaning it, as will also the machine shown in fig. 2.

Onions.—Onion seed, even if the whole field does not ripen together, which, however, it generally does, is easily gathered head by head. If thoroughly ripe it can easily be shelled by light threshing and with a fanning mill and low wind can be

readily cleaned. The onion seed plot at the Farm this year was not a fair test as many varieties were grown and in order to keep them pure, the heads were put in paper bags, thus undoubtedly reducing the yield.

YIELDS.

Below will be found the average yield per plant of some of the different varieties of vegetables, together with a germination test.

YIELDS of seed from different vegetable plants, Central Experimental Farm, 1915.

Vegetable.	Maximum yield per plant.	Average yield per plant.	Lowest yield per plant.	Germination.
	oz.	oz.	oz.	
Beet	12	5·6	1·3	88–97
Carrot	....	2·5	....	85
Celery (green)	....	1·18	....	93
Celery (ripe)	....	1	....	72
Cabbage	2·25	2	1·75	90–100

The following number of plants of each kind of vegetable was grown by the Horticultural Division in 1915. A note regarding the total amount of seed grown is also appended. It must be remembered that many of the varieties were grown under cotton covers to keep them from crossing and that this materially reduces the yield. The average yields per plant referred to in table No. 1 were computed from plants that were not covered and hence will not compare with those here referred to, which are total yields of covered and uncovered. The piece of land used for growing these seeds was 100 by 40 feet in dimensions.

Number of Plants and Weight of Seed Produced at Central Experimental Farm, 1915.

Variety.	Number of plants.	Weight of seed.	Approximate retail value
		lb. oz.	$
Cabbage	66	2 9	5·20
Celery	186	9 9	43·87
Carrot	176	9 12	16·06
Beet	113	40 9	50·00
			115·13 = $1,253· per acre.

The above estimate of value is based on the retail price per pound of the different kinds of seed.

N.B.—As the cabbage plants were nearly all covered, the amount of seed set was very light.

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ORNAMENTAL GARDENING.

F. E. Buck, B.S.A., *Assistant in Charge.*

The report which follows dealing with ornamental gardening activities at the Central Farm at Ottawa during 1915-16 is written from the standpoint, this year, of the progress made in some of the more detailed phases of the work.

CHINA ASTERS.

The annual aster, or more correctly the China aster, is now one of the most popular flowers grown. In its season it is without a rival. The aster came from China about 1731. It is botanically known as *Callistephus chinensis* or *hortensis*, which signifies "beautiful crown."

A large number of varieties has been under trial for some years at Ottawa and also at the branch Farms. For the past two or three years, in addition to the main or variety trials, experiments and observations have been made to gain information on a peculiar and modern affection of the plants sometimes called aster "yellows." The experiments will be carried on for another year, however, before results are given.

DIFFERENT TYPES OF ASTER.

The original aster was single in form and almost two feet high. Soon after its introduction into Britain double forms became the rule. About 1850 the "quilled" type was originated. This type is so named on account of the quilled or rolled form of its florets. The flowers of this type are almost globular in shape.

Since that date all the other forms or types have been produced. Attention was first given to producing dwarf and bedding types. Then followed in the eighties and nineties of last century the strap or flat-rayed types like the Comet asters and the loose fluffy types like the Ostrich Plume. These remain to-day great favourites.

Deservedly, however, the most popular types to-day are the branching asters. These produce flowers of both globular and somewhat flattened form. The flowers are of large size, borne on long, strong stems, making them excellent for cutting.

During recent years these branching asters have given most satisfaction at the Farms, although all other forms are still grown in limited quantities as well.

CLASSIFICATION OF THE ASTER.

There are several systems of classifying asters, some more elaborate perhaps than necessary. The system which follows is one aiming at simplicity and practicability. In describing the best asters some system of classification is necessary. Those, however, who grow these flowers for general use are not interested in any elaborate or botanical classification. What is sought, therefore, in the following system is to group together asters which are similar in main characteristics of vigour and size of plants, and general type or size of flowers.

The asters mentioned in group 1 consist of varieties which are highly recommended.

1. The plants are large and generally vigorous. From 1½ to 2½ feet high.
2. The flower stems are long and generally thick.
3. In some cases the stems branch from the main stem in all directions; in other cases they are upright or only partly spreading.
4. The flowers are of large size and lasting in quality either on the plant or when cut.

Group 1.

Branching Asters.—Branching asters are divided into two classes, early and late. They are without doubt the best asters for the gardens of the amateur. The plants are large and vigorous; the stems long and generally thick; and the flowers full and double to the centre, and of large size. Colours are numerous. Amongst the early branching the White, Rose, Crimson, Dark Violet, and Shell Pink, are good varieties. Amongst the late branching the following varieties are recommended, Snow White, Peach Blossom, Semple Pink, Deep Pink, Rose, and Dark Violet.

King Asters.—Plants similar in habit of growth to the branching asters. The florets of the flowers, however, are long, narrow, and folded lengthwise, somewhat similar to the quilled asters. Last well when cut. Colours recommended, White King, Rose King, Violet King, Pink King, and Crimson King.

Perfection Asters.—Plants vigorous. Flowers large and attractive, with the middle rows of florets whorled. Colours recommended, White Perfection, Rose Perfection, Purple Perfection, Crimson Perfection.

Truffaut and the French Paeony-flowered asters are strains of asters which are similar in all the essentials to the above. The flowers of these asters are ball-shaped and the individual florets incurved.

Late Upright.—The plants of this strain of asters are very upright in habit of growth, although in other respects they are similar to the late branching. Their upright habit permits of much closer planting, and the blossoms are very seldom soiled by rain-storms. Colours recommended, White, Peach Blossom, Crimson, and Purple.

Imperial Asters.—This is another strain of asters the plants of which are upright in habit of growth. The stems are long and the flowers large and ball-shaped. The noted Daybreak is included in this class. They are rather earlier than some of those previously mentioned. Varieties recommended, Giant Daybreak, Giant Purity, Imperial Violet, Imperial Yellow, Imperial Salmon, and Imperial Rose.

Various Special Varieties:—

Pink Enchantress, a beautiful pink aster with graceful flowers.

Semple Late Branching Pink, another beautiful pink aster with graceful flowers.

Autumn Glory, a late branching aster, shell-pink in colour.

Mammoth Asters, a type of large flowering asters resembling chrysanthemums. Borne on long stems. Suitable for cutting. Colours various.

Giant French Paeony-flowered. Flowers of large size on good strong stems.

Non-Lateral Branching. Plants similar in habit to the late branching.

Ray Asters. An aster which has good lasting characteristics and does well in a wet season. Plants vigorous and flowers large. Colours white and pink.

Comet and Ostrich Plume Types.—The plants of these varieties are not quite so large as those preceding. The flowers, however, are very beautiful. They are somewhat flattened, with the individual florets narrow, very long, and gracefully reflexed. The florets towards the centre of the head bend and curl across each other giving to the flower a fluffy appearance. Varieties recommended, Rochester, Shell-pink Rochester, White Rochester, Crimson Rochester, and Dark Violet Rochester.

Crego, and Hohenzollern: White, Shell-pink, Lavender and Rose.

Ostrich Plume, late flowering: A good strain flowering after the ordinary Ostrich Plume are over. Colours white, shell-pink, and blue.

Mikado Comet, varieties recommended: White, Rose, Dark Violet.

Triumph Comet: in various colours, also special varieties of the Comet type such as Meteor and Blushing Beauty.

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Group 2.

The asters placed in group 2 are in all cases recommended, but are varieties which are not so attractive in colour, so large, or so excellent in some other characteristic as those in group 1. They are also suitable for general cultivation in a small garden, and should be grown where space is available, and where variety of type is desired.

Early and Late Branching.—The colours not included in group 1.

King Asters.—The colours not included in group 1.

Comet and Giant Comet.—Colours not included in group 1.

Ostrich Plume.—Colours not included in group 1.

Victoria Asters.—Particularly the white, rose, and scarlet. These asters are produced freely on plants of upright habit of growth and are suitable for bedding purposes. The florets of the flowers are reflexed.

Early Flowering Royal Asters.—An early aster similar to the Early Branching.

Anemone-flowered Aster.—A rather new introduction, the flowers of which are large in size and have curled central florets, pink in colour.

Fire King Aster.—A dwarf crimson-scarlet aster, very suitable for bedding purposes.

Sutton Snowball.—Pure white aster and one of the best for bedding purposes.

Group 3.

The asters placed in this group are, as a rule, grown for special purposes. They are inferior in size, height and attractiveness to those in the first two groups, and should be grown only when early or bedding types are required.

Queen of the Market.—An early aster of rather spreading habit; season of bloom short; useful for cutting for the early market.

Superb Bedding.—A good aster, rather dwarf, useful for bedding purposes.

Alexandra.—Early type of aster of spreading habit of growth.

Dwarf Victoria.

Dwarf French.

Dwarf Chrysanthemum-flowered.—These last three types are all useful as bedding asters.

Single Asters.—A race of asters which has become popular with some during the past few years. Colours various. Useful for cutting.

GROWING THE ASTER.

The asters at Ottawa are grown from seed imported from Europe, the United States and from home-grown seed. The seed is sown about the middle of April. The plants are pricked out into hotbeds about the middle of May, and transplanted into the test plots about the first week in June.

Fairly good plants are also sometimes obtained by sowing the seed in the open ground about May 15, and thinning the plants out to about 9 inches apart.

The blooming season of the asters commences about the middle of July, when the early asters such as the Queen of the Market and Alexandra commence to bloom.

The majority, however, do not start to bloom until about the first week of August, while the late varieties such as the Late Branching and the Late Upright commence to bloom as late as the second week of August. The early asters are over in about three weeks and for this reason are not highly recommended. The main crop of asters, however, is not over until about the third week of September.

Asters succeed in any good type of soil which is well watered and well cultivated.

ASTER TROUBLES.

China asters are not troubled to any extent with diseases or insects. The stem rot is not uncommon. It may be prevented, however, by care in watering, so as to guard against a soggy condition of the soil, especially when the asters are young.

The orange rust, which attacks the plants on the underside of the leaves when about 6 inches high, may be controlled by one or two sprayings with ammoniacal copper carbonate. Care should be taken to see that the spray reaches the underside of the leaves.

The aster beetle should be controlled by a poison spray, and the tarnished plant bug by nicotine or kerosene emulsion.

NOVELTIES AND NEW VARIETIES OF ANNUAL FLOWERS.

Under this heading brief notes are given each year on a number of annual flowers which make their appearance for the first or second time in the test plots of annual flowers grown at the Central Farm at Ottawa. Several hundred varieties are grown for trial purposes. Each year all of the large seedsmen offer "novelties" or new strains and the seeds of these are obtained and the plants grown in the trial plots for comparison with the ordinary varieties. This year rather fewer than usual were of special note. Altogether about three dozen flowers, which were either novelties or only recently offered to the Canadian public, were tested.

Carnation: Improved Marguerite.—Plants about 18 inches high, producing an abundance of fringed double flowers. Various colours. In bloom from August 19 till late October. Attractive in the border and most useful for table decoration.

Carnation: Perpetual Early Flowering.—Very similar in most respects to the Marguerite variety mentioned above, and as highly recommended. In bloom from August 16 till late October.

Dianthus Heddewigii (Japan Pink).—Superb single varieties. Plants 9 to 12 inches. Free flowering habit. Flowers large size, brilliantly coloured. In bloom from August 1 till late October. Useful for bedding and the flowers suitable for bouquets.

Datura chlorantha flore pleno (Datura, Horn of Plenty).—Plants from 2 to 3 feet high with large leaves and making rather rank growth, with slightly fragrant yellow double trumpet-shaped flowers. Rather attractive. In flower from August 20 until October 11. Useful for the border or in a position where a strong foliage plant can be used.

Datura Wrightii.—This variety is much larger than the former, growing from 3 to 4 feet high. The flowers are trumpet shaped, single and pure white. A large plant with a sub-tropical appearance and can be used to advantage in the back of the border or in the centre of a bed. In bloom from July 19 until October 11.

Lobelia.—During the past few years the Farm has tested about twenty-four different varieties of bedding Lobelias. Of these the following are considered the best:

Ramosa (Tenuior), pale blue, height 9 to 12 inches; Ramosa (Tenuior), blue, height 9 to 12 inches; Spreading Basket, blue; Compact Lustrous, dark blue, height 6 inches.

The Ramosa types are somewhat new but on account of the size of their individual flowers together with the brilliancy of the blue, these Lobelias are very attractive strains.

Maurandya purpurea grandiflora.—This is a slender climber which would be very useful for window-boxes, although it is frequently used for conservatory purposes. It blooms continuously although not very profusely. In bloom from August 1 to late October.

Nyeterinia selaginoides.—Plants about 9 inches high, with an appearance very similar to Sweet Alyssum. Flowers borne in profusion and sweet-scented, pale blue and white in colour. In bloom from July 6 until August 22. Useful for edging, or in the front of the border.

Pentstemon, Giant Mixed Colours.—Plants 1 to 2 feet high, producing long flower spikes on which are contained very attractive bell-shaped flowers of varied colours. Grown as annuals they make very useful flowers for cutting, or for border effects towards the end of the season. In bloom from July 29 until late October.

Sanvitalia procumbens.—Plants about 6 inches high, of very spreading habit of growth so as to form a carpet, in a sandy type of soil from 2 to 3 feet wide, which is covered with small, yellow flowers that are produced in considerable quantities during most of the summer. In bloom from June 27 until October 11. Useful for rock gardening or for edging where space is not a consideration.

Sunflower.—Plants 3 to 4 feet high, of very branching character, producing a large quantity of flower heads from side branches. During the past few years several novelties have been put on the market under various horticultural names. The New Red and Unique are two of the varieties that have been tested. Grown side by side, however, there is very little difference noticed in the character of the plant, and hardly sufficient difference in the colour of the flowers to make it worth while growing more than one of these varieties. The Red Sunflower was perhaps the most attractive grown at Ottawa this year. Useful where large flowers are required and for the back of the border. In bloom from July 4 until October 11.

Thunbergia alata.—Plants much used as a greenhouse climber and for suspended baskets. It does not do well, however, when grown outside. It spreads in a thick, compact mass and its canary-yellow flowers are rather attractive. In bloom from July 6 to October 11.

Zinnia, Curled and Crested, Double.—Plants very similar to the ordinary well-known Zinnia. Height about 18 inches. Flowers, however, are as the name suggests, curled and crested. A novelty of the past few years, not very attractive but still a good addition to the easily grown annuals. Colour various. In bloom from July 1 until October 11.

Dianthus, Lucifer.—A novelty of 1915. Plants about 12 inches high. A very fine addition to the Japanese Pink. Free flowering with bright scarlet flowers. Early in coming into bloom. In bloom from July 20 till late October.

VARIETIES WITHOUT SPECIAL MERIT.

The following varieties were also grown for test for the first time this year but are not described at length for the reason that they have no special merits to justify

giving them a place amongst the above or a place in preference to better known varieties of the same flowers:—

Sunflower, Unique Red, similar to New Red.
" Langley Gem, similar to New Red.
Zinnia, Double Curled and Crested.
Cuphea miniata.
Ornamental Chilian Beet.
Red Mountain Spinach (*Atriplex hortensis*).
Double Mixed Daisies (*Bellis*).
Salvia patens, Early dwarf, blue flowered.
Tithonia speciosa.

BULBS.

For growing in pots for house decoration, the class of plants known as "bulbs" has few rivals. This is due to the fact that few flowers can be grown with such a minimum amount of care and attention. By following a few of the simplest rules beautiful blossoms always result.

A previous report treated of bulbs as flowers for beds and borders. The list of bulbs which follow in this report consist of those which have been found to be specially suited for forcing in the house or greenhouse.

The bulbs are received about September of each year and are potted up into 6-inch pots during October. Ordinary greenhouse soil consisting of rotted sod and a little sand is used for potting. The pots are then placed in a cool root cellar for several months. During this period roots are formed.

The Narcissi and early tulips are brought up into the greenhouse towards the end of December or early in January. For the first few days, after coming up from the semi-darkness of the cellar, they are kept in a subdued light. Immediately they are placed in the full light and heat, growth takes place very rapidly and they may be brought into flower in about three weeks from the time they are brought up. To obtain a continuity of bloom some are retained in storage for several weeks longer.

The Darwin tulips are brought up last, generally as late as the middle to the end of February. This lengthens the blooming season of the house bulbs, which by this method lasts for about three months.

Successful culture of bulbs in the house may be epitomized thus:—

(1) Pot reasonably early in any good porous soil.

(2) Place in a cool cellar or room and water regularly or when the soil appears to be in need of water.

(3) Maintain the temperature of the storage room at about or not above 40 degrees.

(4) After about two months bring up into a temperature of from 50 to 60 degrees and into partial light for about a week.

(5) Then place in full light and water amply and regularly.

(6) When in bloom, again place in a cooler temperature, where it is possible to do so. This prolongs the life of the flowers.

Bulbs for House Culture.

Early tulips:—

Albion or White Hawk	White	Flower of good substance; lasts well.
Joost van Vondel	"	The largest pure white tulip, of fine form.
Pottebakker, white	"	
La Reine	"	White sometimes turning pink.
Gold Finch	Yellow	Sweet scented and lasts well.
Mon Tresor	"	Suitable as an early variety for forcing.
Primrose Queen	"	Sulphur yellow, attractive.
Yellow Prince	"	Yellow tinged pink, sweet scented.
Cottage Maid	Pink and White	
Pink Beauty	" "	Bright pink.
Rose Grisdelia	Pink.	
Belle Alliance	Scarlet	Scarlet, sweet scented.
Cramoisie Brilliant	Vermilion.	
Crimson King	Crimson scarlet.	
Vermilion Brilliant	Brilliant vermilion	Large flower, easy to force.
Prince of Austria	Orange vermilion.	
Proserpine	Carmine.	
Thomas Moore	Apricot orange	Distinct colour, fine shaped flower, sweet scented.

An excellent choice from the above would be:—

Joost van Vondel	for White.
Gold Finch	" Yellow.
Rose Grisdelia	" Pink
Vermilion Brilliant	" Scarlet.
Primrose Queen	" Light yellow, attractive and distinct.
Thomas Moore	Apricot orange, attractive and distinct.

Late Tulips (double)—

Couronne d'or	Deep yellow.
Imperator Rubrorum	Bright scarlet.
Murillo	Fine pink.

Darwin Tulips (*Late Flowering*).—Outside in the perennial border the Darwin tulips form one of the most attractive features in the month of May. During the past few years experiments have been carried on in forcing them in the greenhouse for inside decorations. Extremely satisfying results have been obtained. They are potted in October with the ordinary tulips but are not brought up for flowering until about the middle of February. By proper handling they may be made to give a succession of magnificent bloom from that date until the middle of April. The following varieties have been found to be best suited for forcing in the greenhouse. They will force in the dwelling house also, but are not so satisfactory there as they are liable to become too tall unless they get abundant light.

	Colour.
Baronne de la Tonnaye	Bright rose, margined blush.
Bartigon	Bright fiery red.
Beauty	Pink shaded mauve.
Clara Butt	Delicate salmon pink.
Edmee	Deep rose pink.
Europe	Scarlet, white at base of petals.
Galathea	Brilliant salmon scarlet.
General de Cordous	Turkey red, blue at base of petals.
Geefs	Rosy crimson shaded blue.
Glow	Vermilion-scarlet, blue base.
Isis	Fiery crimson scarlet.
King Harold	Bright crimson.
Loveliness	Soft carmine rose.
Margaret	Silvery white and pink.
Madame Krelage	Soft rose shading to white.
Ouida	Brilliant scarlet.
Pride of Haarlem	Rose suffused purple.
Professor Rawenhof	Bright cherry red.
The Sultan	Glossy maroon black.
Whistler	Blood red, violet base of petals.
Wedding Veil	Lilac white.

Narcissi.

Trumpet Section—	Colour.	Fuller Description.
Madame de Graaf	White	Perianth pure white, trumpet nearly white.
Empress	Bicolor	" " " " rich yellow.
Victoria	"	Perianth creamy white, trumpet rich yellow.
Golden Spur	Yellow	The earliest variety for forcing.
Princeps	"	Trumpet a deeper yellow.
Emperor	"	Perianth yellow with trumpet a deeper yellow.
Other Types—		
Poeticus ornatus	White	White perianth margined with scarlet.
" Glory	"	White perianth eye margined with scarlet, larger flowers.
Barri conspicuous	Bicolor	Yellow perianth, short cup edged with orange and scarlet.
" Seagull	"	White perianth, yellow cup.
Sir Watkin	"	Perianth primrose, large yellow cup.
Chinese Sacred Lily	"	White with yellow cup.
Paper White Polyanthus	White	Pure white.
Double Van Sion	Yellow	Double golden yellow.

Freesias.

Refracta alba	Pure white.
Hybrids	Pink and lavender shades.

Some Good Hyacinths.

La Grandesse	Snow white.
Madame Van der Hoop	White, late flowering.
Yellow Hammer	Golden yellow.
King of Yellows	Golden yellow.
Charles Dickens	Pink.
Gigantea	Blush pink.
Enchantress	Clear light blue.
Grand Lilas	Porcelain blue.
King of Blues	Dark blue.
Lord Balfour	Pinkish mauve.
General Pelissier	Carmine red.

THE CANNA.

A large number of Cannas have been grown for a number of years at Ottawa. They have been used for bedding purposes and grown also in the test plots in order to obtain information as to their relative merits.

The Canna is a sub-tropical plant of easy culture which can be used effectively as a bedding plant, as a foliage plant in the border, or as both a foliage and a flowering plant in the greenhouse or conservatory. During recent years it has gained in favour and in popularity and has undergone as a flowering plant many improvements.

The most recent introductions are the Orchid-flowered Cannas. Prior to their introduction the Gladioli-flowered or "Crozy Dwarf" were considered vast improvements on the older species and varieties. Hybridizing and selecting has been carried on both in Europe and on this continent, and to-day the Canna is a commercial flower of considerable importance.

The Canna can be raised from seed which should be started early in the year, in order to give bedding plants for the same season. It is generally propagated, however, by division of the stored roots. Canna roots should be dug in the autumn as soon as the tops are killed by frost. After drying for a few days they should be stored in a frost-proof cellar, which must not be damp, nor too cool, otherwise they are apt to rot. On the other hand if the cellar is too dry they should be covered with some coarse material or placed in dry sand.

About the last week in March or early in April the old roots should be divided and potted in good soil. Careful watering should be practised until the shoots are several inches long. If the spring is warm growth is then inclined to be very rapid and it may be necessary to keep the plants in a cool place in the greenhouse to check growth.

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Otherwise they are apt to be ready for planting out before danger from frost is passed, as a late spring frost will kill them back to the ground. In Ottawa, planting out generally takes place about the first week in June. The Canna requires a rich soil, retentive of moisture. In such a soil, when the summer is hot, and water is supplied liberally, their growth is most rapid and luxuriant.

The flower spike, as well as the colour, size, and lasting habits of the individual flowers, are points which are considered when estimating the relative merits of a good bedding Canna. As the Canna is to a large extent a foliage plant the height of the plant as well as the colour of its foliage, has to be considered.

The Cannas mentioned in the following list are those which have been tested at the Farm during the past twelve years. Following this complete list will be found other lists giving some of the best varieties, together with lists giving tall and dwarf varieties.

It should be added, however, that in some parts of Canada the Canna does not succeed well. This is because it is a tropical plant and must have a certain amount of heat. It must also be pointed out that in some cities of Canada one variety will do much better than it will at Ottawa. This is due also to seasonal effects, and adaptations to local conditions. Many of the newer varieties of Cannas are not procurable as yet in the smaller cities.

The final list of Cannas, therefore, consists of varieties which growers in various parts of the Dominion have found to succeed under average conditions.

Complete List of Cannas Tested at Ottawa.

Africa, orchid flowered.
Alfred F. Conard.
Allemania, orchid flowered.
Alphonse Bouvier.
America.
Aphrodite, orchid flowered.
Asia.
Austria, orchid flowered.
Baron de Poilly.
Bassett's Red.
Bavaria.
Beacon.
Beaute de Poitevine.
Black Beauty.
Brandywine.
Burbank, orchid flowered.
Buttercup.
California.
Captain Druyon.
C. Bernardin.
C. Henderson.
Charles Paul.
Chautauqua.
Cherokee.
Chicago.
Cinnabar.
Comte de Bouchaud.
Comte de Sachs.
Comte Horace de Choiseul.
Conowingo.
Comet Improved.
Crimson Bedder.
Dagana.
David Harum.
Depute Ravarin.
Director Holtze.
Discolor Gigantea.
Dr. Budingen.
Dr. E. Ackerknecht.
Dr. Marius.
Dr. Nansen.
Dr. Robert Funcke.
Duke of Marlboro.
Gladiator.
Goliath.
Golden B.
Governor Roosevelt.
Grandiflora.
Graf Oswald de Kerchove.
Grand Chancellor Buelow.
Gustave Gumpfer.
Halley's Comet.
Harry Laing.
Hof Gardtner Hoppe.
Hof Garden Director Lanche.
Hortense Barbereau.
Hugues Lapaire.
Hungaria.
H. Wendland.
Indiana.
Inglewood.
Italia, orchid flowered.
J. B. Deleuil (The Butterfly Canna).
J. D. Cabos.
J. D. Eisele.
J. H. Veitch.
Johanna Kanzleiter.
Joseph Combit.
Jupiter.
Kaiser Wilhelm.
Kate Deemer.
King Humbert, orchid flowered.
La France.
Leon Pepin Lehalleur.
Leonard Vaughan.
Louisiana, orchid flowered.
Louise.
Luray.
Madagascar.
Martha Washington.
Menelek.
Mephisto.
Meteor.
Minnehaha.
Miss Berthine Brunner.
No. 1507.
No. 2739.
Olympic.
Ondine.
Pandora.
Papa Canna.
Papa Nardy.
Parthenope, orchid flowered.
Patrie.
Paul Lorenz.
Paul Marquant.
Peach Bloom.
Pennsylvania, orchid flowered.
Pillar of Fire.
President Cleveland.
" McKinley
" Meyer.
" Vermorel.
Prof. Hugo de Vries.
Prof. Rodenwaldt.
Prof. Romberg.
Progression.
Queen Charlotte.
Queen of Holland.
Richard Wallace.
Robert Christy.
Roi des Ronges.
Rosea Gigantea.
R. Pearson.
Rubin.
Sam Trelease.
Secretaire Chabanne.
Shenandoah.
Souvenir de Jeanne Chaure.
Souvenir de A. Crozy.
Souvenir de Leonie Veinnot.
Souvenir de President Carnot.
Splendor.
Stradtradt Heidenriech.

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COMPLETED List of Cannas Tested at Ottawa—*Concluded.*

Striped Beauty.
Suevia.
Eastern Beauty.
Egandale.
Eldorado.
Elizabeth Hoss.
Explorateur Crampbel.
Evolution.
Fair Hope.
Feuermeer.
Flamingo.
F. L. Harris.
Florence Vaughan.
Francois Billard.
Franz Buchner.
Frau Marie Nagel.
Furst Bismarck.
Furst von Hohenlohe.
General Merkel.
Gladiflora.
Mme. Crozy.
Mme. Favrichon.
Mme. Jean Beurier.
Mme. Leon Leclerc.
Mme. Marguerite Muhle.
Mme. Montefiore.
Mme. Pichon.
Mont Blanc.
Mount Etna.
Mrs. Alfred F. Conard.
Mrs. G. A. Strohlein.
Mrs. Karl Kelsey, orchid flowered.
Mrs. Kate Gray, orchid flowered.
Mlle Berat.
New York.
Niagara.
Sunray.
Tarrytown.
The Express.
Tisza.
Triumph.
Uncle Sam.
Veinnot.
Venus.
Wabash.
Wawa.
West Virginia.
Wilhelm Bofinger.
William Saunders.
Wm. Griesinger.
Wyoming, orchid flowered.
Yellow Crozy.

LIST of fifty best Cannas. Those marked * have purple foliage.

	Description.
Allemania, Orchid flowered	Salmon with golden markings.
*America	Salmon scarlet.
*Brandywine	Cherry red, margined crimson chocolate.
Chicago	Salmon rose.
Cinnabar	Salmon scarlet and yellow margin.
Crimson Bedder	Bright crimson scarlet.
*Dagana	Scarlet dotted crimson.
*David Harum	Bright-vermilion scarlet.
*Discolor Gigantea	Seldom blooms. Grown for foliage effect.
*Dr. Budingen	Crimson scarlet.
Dr. Robert Funcke	Crimson.
Eldorado	Golden yellow spotted red.
Elizabeth Hoss	Yellow spotted red.
Fair Hope	Crimson flaked orange.
Feuermeer	Fiery scarlet shaded crimson.
General Merkel	Scarlet suffused orange and yellow.
Gladiflora	Yellow blotched scarlet.
Gladiator	Yellow spotted dull red.
Grandiflora	Salmon red and cerise.
Grand Chancellor Buelow	Scarlet suffused deep crimson.
*Hof Gardtner Hoppe	Red mottled crimson.
Hungaria	Pink shading to cream.
Indiana	Orange shaded salmon.
J. D. Eisele	Scarlet shading to crimson.
*J. H. Veitch	Crimson scarlet.
Johanna Kanzleiter	Yellow marbled carmine.
Jupiter	Bright red bordered golden.
*King Humbert, Orchid flowered	Orange scarlet, red markings.
Louisiana, Orchid flowered	Glowing scarlet, orange throat.
Louise	Flesh marbled carmine.
Mephisto	Crimson-maroon.
Meteor	Scarlet suffused crimson.
Miss Berthine Brunner	Yellow spotted carmine.
Mme. Marguerite Muhle	Rosy cerise.
Mrs. Alfred F. Conard	Salmon pink.
*Mrs. G. A. Strohlein	Magenta and scarlet.
Mrs Kate Gray	Crimson gold.
*New York	Crimson shaded darker crimson.
Pennsylvania, Orchid flowered	Vermilion scarlet and orange.
*President Meyer	Carmine and scarlet.
Progression	Golden yellow spotted bronze.
Queen Charlotte	Scarlet bordered yellow.
Richard Wallace	Yellow, slightly spotted.
*Rubin	Ruby carmine.
Tarrytown	Pinkish cerise and crimson.
Uncle Sam	Orange scarlet.
Venus	Rose-pink, mottled cream.
Wilhelm Bofinger	Orange-scarlet.
*Wm. Saunders	Crimson.
*Wyoming, Orchid flowered	Orange.

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The following are some of the best Tall varieties, growing 5 to 6 feet high:—

Fair Hope.
Indiana.
Mrs. Kate Gray.
Wyoming.
Pennsylvania.
Uncle Sam.

Medium varieties, about 4 feet high:—

Allemania.
America.
David Harum.
Cinnabar.
Dr. Robert Funcke.
Eldorado.
General Merkel.
Louise.
Mme. Marguerite Muhle.

Dwarf varieties, about 2 feet high:—

Dagana.
Dr. Marcus.
Brandywine.
Gladiator.
Crimson Bedder.
Wm. Saunders.

LIST OF CANNAS WHICH HAVE BEEN FOUND MOST SUCCESSFUL IN VARIOUS PARTS OF THE DOMINION.

The growers in various parts of the Dominion supplied the following list of Cannas as being those which they have found to be most successful with them. The first six are the most popular in the list: —

King Humbert.
Florence Vaughan.
Alphonse Bouvier.
President Meyer.
Chas. Henderson.
Duke of Marlboro.
Admiral Dewey.
Crimson Bedder.
J. D. Eisele.
Venus.
New York.
Rubin.
Mme. Crozy.
Richard Wallace.
Mont Blanc.
Mrs. Kate Gray.
Pennsylvania.
Buttercup.
Eldorado.
Egandale.

DAHLIAS.

Where the dahlia succeeds it is a very satisfactory flower for the amateur. The dahlia, however, requires plenty of moisture, rich soil, occasional artificial fertilizing, and not too hot a climate. At Ottawa, owing to the hot summers, not more than one year in every four or five proves to be suitable for dahlias.

CULTIVATION.

For amateurs the usual method of growing dahlias is that of root division. The roots of one year are stored in cellars and divided up for new plants the following spring. The storage room for these roots should be frost proof and not too dry. Conditions which are suitable for storing potatoes are suitable for the storing of dahlias. These roots may be planted out into the garden towards the end of May, or earlier if no danger from late frosts is expected. They may be planted from 2 feet to 4 feet apart, according to space available, and the size of the root planted. When dividing the roots care must be taken to see that each part has at least one eye, which will be found on the crown to which the true roots are attached.

Another method, generally the commercial method, of propagating dahlias is by means of cuttings. During recent years raising them from seed has also grown in favour. In fact in the case of the new Collarette dahlias it is the simplest and best method. The seed should be sown about the beginning of April

RECENT POPULARITY AND MODERN TYPES.

The dahlia is much more popular to-day than ever before. It was in great favour some years ago but declined in popularity owing to its somewhat stiff formal appearance. This was especially true of the "Show" dahlias. With the introduction of new types this prejudice against dahlias has somewhat lessened and to-day there is a distinctly revived interest in dahlia growing. The "Cactus," "Decorative," "Paeony-flowered" and lastly the newest "Collarette" dahlias are not known to many people who recall only the older type of show dahlias.

Collarette dahlias and other dahlias when raised from seed form very useful border plants and give blossom late in the year when bloom in the perennial border is rather scarce. It is not necessary to save roots when thus used as seed sown each year gives strong plants and abundance of them.

The named varieties of dahlias run up into the thousands. "Show" dahlias are generally of one colour, "Fancy" of two or more. These two types constitute the older and better-known dahlias.

The "Cactus" first appeared about 1880 and is the most popular type to-day. The "Decorative" or Cactus hybrids possess broad flat rays and are much less stiff in appearance than the show and fancy. "Pompon" dahlias are dwarf forms of the show type but the plants are very prolific and the individual flowers are rather pretty. "Single" dahlias are, as the name implies, single forms of different types of dahlias. The single cactus dahlias are prettier than the ordinary single. A "Quilled" dahlia is midway in type between the show and the decorative or cactus, and the florets are rolled for about two-thirds of their way up. This gives the quilled appearance, hence the name. These quilled generally form a distinct class.

The most recent introduction is the "Collarette" dahlia. The flowers are single with an additional row of short petals or florets around the disk. This presents the appearance of a frill or collar and, as it is usually of a different colour from the remainder of the flower, the total effect is novel and pleasing. The first Collarette dahlia was introduced in 1900, and offered for sale in 1901. This type has been raised from seed and tested at the Farm now for several years and given considerable satisfaction. Seedlings are produced in various colours. They can be procured, however, as named varieties.

The "Pæony-flowered" dahlia is another recent introduction and did not appear in America till 1908. Recently a fragrant form of this type was introduced which promises to become popular.

The dahlia has been grown as a garden flower for about 100 years. Where the summers are suitable the amateur will find few flowers which will respond more readily to care and make such an imposing show. The varieties given below are of some of the older types which have withstood the severe tests of the Ottawa summers and are therefore recommended. New varieties not in these lists should also be grown.

COMPLETE List of Dahlias Tested at Ottawa:—

A. D. Livoni.
American Flag.
Aurata.
Austin Canpell.
Beauty Inconstant.
Bird of Passage.
Bishop of Durham.
Blanche Keith.
Blue Oban.
Bon Ton.
Cactus Queen.
Cannell Gem.
Capstan.
Catharine Duer.
Gabriel.
Gem.
Gilt Edge.
Gloriosa.
Grand Duke Alexis.
Harry Stredwick.
Hector.
Herbert Turner.
Hubert.
Island Queen.
Iridescent.
Jessie McIntosh.
John Cowan.
John Sladden.
Mrs. Gladstone.
Mrs. Leopold Seymour.
Mrs. Peart.
Mrs. Langtry.
Mrs. Wheeler.
Mrs. Winters.
Nemesis.
Oriole.
Paragon.
Pendent.
Perfect Vallon.
Prof. Zacharias.
Prince of Orange.
Prince Imperial.

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COMPLETE List of Dahlias Tested at Ottawa.—*Continued.*

Chairmain.
Clifford W. Bruton.
Cochineal.
Collarette.
Conspicua.
Constance.
Countess of Lonsdale.
Crimson Beauty.
Cuban Giant.
Cycle.
Double Cactus.
Double Claret.
Double Collarette.
Double Giant Paeony-flowered mixed.
Earl of Pembroke.
Empress of India.
Ernest Glasse.
Exquisite.
Eureka.
Evadne.
Fairy Queen.
Fairy Tales.
Fashion.
Fern-leaved Beauty.
Flossie.
Kingfisher.
Kriemhilde.
Kynerith.
Lady Autrobus.
Lady H. Grosvenor.
Lemon Grant.
Little Morris.
Lilliputian.
Lord Hawke.
Louis Hariot.
Lurline.
Lyndhurst.
Mammoth Queen.
Mantas la Villa.
Marguerite.
Marguerite Bruant.
Matchless.
Maurice Riviore.
M. D. Hallock.
Miss Annie Jones.
Miss Finch.
Modest.
Mr. Moore.
Mrs. Clarke.
Mrs. Beedle.
Mrs. Chas. Turner.
Mrs. Dodds.
Queen of Primroses.
Rosenhagen.
Single Collarette.
Single Cream.
Single Exhibition Prize.
Single, Good Magenta.
Single Pink.
Single Red.
Single Selected.
Single White.
Snowclad.
Snowflake.
Standard Bearer.
Sambo.
Susan Ingham.
Sylvia.
Uncertainty.
Victory.
Winsome.
Wm. Agnew.
Wm. Moore.
Wm. Pearce.
Woman in White.
W. T. Abery.

A list of good dahlias from those grown at the Central Farm, Ottawa, during recent years:—

Bon Ton (Show)	Rich reddish crimson.
Clifford W. Bruton (Cactus)	Yellow tinged golden.
Crimson Beauty (Show)	Reddish crimson, fading.
Cuban Giant (Show)	Rich dark claret.
Cactus Queen (Cactus)	Velvety reddish crimson.
Capstan (Cactus)	Bright salmon scarlet.
Countess of Lonsdale (Cactus)	Salmon red tinged carmine.
Evadne (Anemone)	Yellowish, outer petals pink.
Empress of India (Cactus)	Deep, or blood red, or deep maroon.
Ernest Glasse (Cactus)	Rich carmine crimson.
Grand Duke Alexis (Decorative)	White tinged lavender or lilac.
Gabriel (Cactus)	Salmon scarlet.
Hector (Show)	Bright salmon red.
Iridescent (Decorative)	Salmon scarlet on buff tinged carmine.
Kingfisher (Cactus)	Silvery reddish carmine.
Mrs. Beedle (Show)	Buff tinged carmine.
Mrs. Langtry (Show)	Carmine, buff in the interior.
Mrs. Leopold Seymour (Cactus)	Duplex lemon buff and carmine.
Mrs. Winters (Decorative)	Creamy white.
M. D. Hallock (Show)	Golden yellow, lemon yellow centre.
Mrs. Chas. Turner (Cactus)	Lemon yellow.
Miss Anne Jones (Cactus)	Glowing salmon scarlet
Mrs. Peart (Cactus)	White tinged lavender.
Prince Imperial (Cactus)	Deep maroon.
Queen of Primrose (Show)	Primrose.
Sylvia (Decorative)	White centre, outer petals pinkish.

GERANIUMS.

The geranium, or more correctly the "Zonal Geranium" to distinguish it from the Crane's Bill, or the true wild geranium, is essentially a people's flower. It is a bedding plant and a greenhouse plant as well. On account of its remarkable vitality, persistence, and freedom from diseases and pests it is perhaps the best known and most reliable house plant in existence. It is easy to grow, may be propagated readily, and blooms freely. It will stand more abuse than any other flowering plant of like qualities, and is not particular as to soil. Amongst modern geraniums are many of beautiful and pleasing colours. With all these qualities and merits it is likely long to retain its popularity.

Propagation is generally by means of cuttings which root easily when planted in sand or a light type of soil. Cuttings may be taken at any time but about August or

in March or April are the two best seasons of the year to get the best success. Seeds may be sown also and plants raised from seed but the colours of such plants will differ from the parent, whereas cuttings will always produce like flowers.

The flower is too well known to require any further remarks. At Ottawa several hundred varieties have been under test for some years. There is a remarkable difference in the value of different varieties. Not more than ten per cent are suitable for bedding purposes. Certain well known varieties have achieved reputation in this connection and these will be found in one of the following lists.

Frequently varieties which do not succeed outside in beds do exceptionally well in the house, while varieties which do well in the beds outside are not the best for house culture. A separate list is given of varieties for house culture.

List of Geraniums grown in recent years at the Central Farm, Ottawa:—

Abbie Schaffer.
Acteon.
A. Dupre.
A. H. Trego.
Alice of Vincennes.
Aldenham.
Alsace-Lorraine.
Alcibiades.
Amaranth.
American Beauty.
Anais Segalais
Arabia.
Arbutus.
A. Ricard.
Ascot.
Athlete.
Attractio...
Aureole.
Banquise.
Baronne Gruhissich.
Baron de Layres.
Baron de Scalibert.
Barbara Hope.
Bastien Lepage.
Beatrice.
Beauty.
Beauty of Richmond.
Beaute de Poitevine.
Bellerophon.
Betty Jones.
B. K. Bliss.
Blanchefleur.
Blue Peter.
Bertha de Pressily.
Bonnat.
Bruantii.
Buffalo Bill.
California.
Campania.
Captain Bloumet.
Captain Holford.
Captain Jolivet.
Carman Sylva.
Catharine Schmidt.
Cevic.
Ceres.
Chatsworth.
Chas. Curtis.
Chevarri Hermanos.
Champ de Neige.
Charles Larelle.
Charles Rabutot.
Cleopatra.
Clyde.
C. Morel.
Colonel Thomas.
Columbia.
Commandant A. Felker.
Countess of Dudley.
Gloire de Lyonaisse.
Granville.
Great White Queen.
Gripper Banks.
Gustave Emich.
Hardisty.
Helen Keller.
Henriot.
Henry A Dreer.
Henry Jacoby.
Hermine.
Heteranthe.
H.Greenhill.
His Majesty.
H. M. Stanley.
Hope Dean
Imogene.
Incandescent.
Iris.
Jacquerie.
James Vick.
Jamaique.
Jane O'Ryan.
Jean Dornis.
Jean Viaud.
Jerome.
J. H. Greenhill.
J. J. Harrison.
John Doyle.
John Lemon.
John P. Cleary.
J. Sallier.
Juste Oliver.
Julia Marlowe.
Jupiter.
Keston.
King Victor.
L'Aube.
Lady Brooke.
Lady E. Malet.
Lady Francis Russell.
Lady Renals.
Lady Roberts.
Lady Sarah Wilson.
La Favorite.
Le Cid.
Le Fram.
Le Soleil.
Leon Perrault.
Lilian Duff.
Lord Ilchester.
Lord Kitchener.
Lord Rosebery.
Louis Fages.
L. Swarthling.
Lucania.
Lumineux.
Madame A. Boulaus.
Madame Adrien Corret.
Mme. Landry.
Mme. Mosnay.
Mme. Recamier.
Mme. Thibaut.
Mrs. A. Blanc.
Mrs. Chas. Platts.
Mrs. Chas. Molin.
Mrs. Cordon.
Mrs. D'Ombrain.
Mrs. E. Gladstone.
Mrs. E. Rawson.
Mrs. Geo. Burke.
Mrs. J. M. Garr.
Mrs. Kendall Barnes.
Mrs. Lawrence.
Mrs. N. B. Currie.
Mrs. Wilfrid.
M. Saleroi.
Naples.
Neptune.
New York.
Nicholas 2.
No. 50.
Norah.
Nydia.
Orange Glory.
Oroso.
Pamela.
Paris.
Paul Boudet.
Paul Crampel.
Paul Desjardin.
Pegasa.
Perfection.
Phalene.
Phyllis.
Pierre Courtois.
Pierre Crozy.
Pink Raspail.
President Baillet.
President McKinley.
President Baumann.
President Victor Duhois
Princess Alix.
Prince Bismarck.
Professor Leon Guignard
Professor Peuch.
Puvis de Chavannes.
Queen of the West.
Rainbow.
Raspail Improved.
Red Wing.
Reformator.
Renommée Lyonaise.
Rene Bazin.
Reticulata.
Rev. H. Harris.
Richmond Beauty.
Rival.

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List of Geraniums grown in recent years at the Central Farm, Ottawa.—*Continued.*

Countess de Roma.
Countess of Rosebery.
Conan Doyle.
Crabbe.
Crimson King.
Cymric.
Daytonia.
Dazzler.
Delicata.
Divinite.
Dorothy.
Double General Grant.
Double Scarlet.
Dryden.
Dr. A. Vialettes
Dr. Clenet.
Dr. Dujardin Beaumetz.
Dr. Levavasseur.
Duchess of York.
Dr. Verneiul.
Dublin.
E. Berlot.
E. Dauthenay.
Edmond Blanc.
Edward Douglade.
Empress.
Enchantress.
Ernest Lauth.
Etiole de Vienne.
Exquisite.
Fanny Thorpe.
Fascination.
Firefly.
Fire Dragon.
Firebrand
Flamingo.
Fleur Blanc.
Fleur de Roze.
Fraicheur.
Fred Bean.
Frogmore.
F. V. Raspail.
Garden Director.
Gettysburg.
Gertrude Pearson.
Gemini.
Gloire de France.
Gloire de Lile.
Madame Bacot.
Madame Bruant.
Madame Castellaine.
Madame Corallic Bajac.
Madame C. Provost.
Madame Debouche.
Madame Jaulin.
Madame Leon Dalloy.
Madame Marmoteck.
Madame Rozain.
Madame Thibaut.
Madame Vaucher.
Madame Victorienne David.
Madonna.
Manteau Rouge.
Mars.
Marguerite de Layres.
Marguerite Pinon.
Mary Beaton.
Mark Twain.
Mary Pelton.
Marquis de Galard.
Marquis de la Costa.
Marvel.
Maurice Thomas.
Maurice Pottecher.
Mauve Queen.
Maxime Kovalevski.
Mazeppa.
M. Chapotin.
M. Conovas.
Mentmore.
Meteor.
Millfield Rival.
Mirador.
Miss Floss.
Miss G. Ashworth.
Miss Hayes.
Miss Willmott.
M. Jarry Desloges.
M. Javoi.
Mlle. Meindre.
Mme. Anastasie Lecadre.
Mlle Ayme de Chevraliere.
Mme. Barney.
Mme. Francois Carnot.
Mme. Halimbourg.
Rodrigue.
Rosemie.
Rosa Bonheur.
Roi Edouard.
Rudyard Kipling.
Russell.
Sam Sloan.
S. A. Nutt.
Saturn.
Salmon Queen.
Scarlet-King of Denmark.
Scevola.
Schone Ulmerir
Sentinel.
Shelley.
Sir E. Cassel.
Sir F. Buxton.
Sir Trevor Lawrence.
Sir T. Hanbury.
Snowdrop.
Snowdrift.
St. Louis.
Surprise.
Tamatav.
Tanagra.
Taurus.
The Countess.
Theta.
The Prince.
Thomas Meehan.
Tour Eiffel.
Triomphe de Nancy.
Umbria.
Venus.
Verge Fleuri.
Vesta.
Vestale.
Ville de Poitiers.
Vincennes.
Virtuose.
W. A. Chalfant.
West Brighton Gem.
White Swan.
Winston Churchill.
Winter Gem.
Wm. Pfitzer.
Wm. Strickland.

GOOD BEDDING GERANIUMS.

Name.	*Description.*
Abbie Schaffer	Double, scarlet.
Athlete	Single, military scarlet.
B. K. Bliss	Double, scarlet.
Bertha de Pressily	Double, bright pink.
Colonel Thomas	" carmine scarlet.
Edmond Blanc	" crimson carmine.
Gloire de France	" silvery rose salmon centre.
Gustave Emich	Semi-double, clear scarlet.
John Doyle	Double, scarlet.
Julia Marlowe	Semi-double, scarlet.
Lady Brooke	Single, white shaded salmon.
La Favorite	Double, white.
Manteau Rouge	Single, scarlet.
Marquis de Galard	Double, salmon scarlet.
Marvel	" scarlet crimson.
Mme. Landry	Semi-double, deep salmon.
Mme. Mosnay	Single, salmon rose.
Mrs. Lawrence	Double, salmon.
Nydia	Double, creamy white, rosy centre.
Paul Crampel	Single, bright scarlet.
" Salmon	" salmon.
Queen of the West	" " scarlet.
Red Wing	Double, scarlet.
Sam Sloan	Single, scarlet.
S. A. Nutt	Double, scarlet crimson.

OTTAWA.

GOOD GERANIUMS FOR HOUSE CULTURE.

Abbie Schaffer	Double, scarlet.
Amaranth	Cactus type, deep pink and white.
Ascot	Single, deep salmon.
Athlete	" military scarlet.
Barbara Hope	" salmon pink, white eye.
Beauty	" scarlet cerise.
B. K. Bliss	Double, scarlet.
Bertha de Pressily	" bright pink.
Ceres	Single, salmon.
Chatsworth	" orange scarlet.
Champ de Neige	Semi-double, white.
Colonel Thomas	Double, carmine scarlet.
Dublin	Single, rosy magenta.
Edmond Blanc	Double, crimson carmine.
Fanny Thorpe	Single, salmon, deeper centre.
Fire Dragon	Cactus type, fiery crimson.
Fred Bean	Single, rosy cerise.
F. V. Raspail	Semi-double, scarlet.
Gettysburg	Single crimson scarlet.
Gloire de France	Double, silvery rose, salmon centre.
John Doyle	" scarlet.
Julia Marlowe	Semi-double, scarlet.
King Victor	Single, clear cerise.
Lady Francis Russell	" pink white centre.
La Favorite	Double, white.
Lord Kitchener	Semi-double, bright scarlet.
Manteau Rouge	Single, scarlet.
Mark Twain	" white flaked carmine.
Marquis de Galard	Double, salmon scarlet.
Marvel	" scarlet crimson.
Maxime Kovalevski	Single, bright salmon scarlet.
Mlle. Meindre	Double, salmon pink margined white.
Mlle. Ayme de Chevraliere	Semi-double, white.
Mme. Landry	" deep salmon.
Mrs. Chas. Platts	Single, pink white eye.
Mrs. Cordon	Double, rosy red.
Mrs. D'Ombrain	Single, bright salmon.
Mrs. E. Rawson	" salmon tinged scarlet.
Mrs. Kendall Barnes	" crimson shot with purole.
Mrs. Lawrence	Double, salmon.
Norah	Single, soft pink.
Paul Crampel	" bright scarlet.
Phyllis	" pale salmon rose.
Raspail Improved	Double, scarlet.
Rev. H. Harris	Single, rosy salmon.
Richmond Beauty	" salmon scarlet, white centre.
Sam Sloan	" scarlet.
S. A. Nutt	Double, scarlet crimson.
Scarlet, King of Denmark	" scarlet.
Shelley	Single, deep crimson.
Venus	" large white.
Warrior	Double, cerise scarlet.

Twelve of the most popular geraniums, as grown in various parts of the Dominion:—

Bedding Varieties—	
Paul Crampel	Single scarlet.
Jacquerie	" red.
S. A. Nutt	Double red.
Alphonse Ricard	" red.
La Favorite	Single white.
Snowdrop	" white.
Madame Recamier	Double white.
Madame Barney	" pink.
Beaute de Poitevine	Semi-double, salmon rose.
For House Culture—	
Mrs. E. G. Hill	Salmon.
Phyllis	Single, pale salmon rose.
Barbara Hope	Salmon pink, white eye.

Paul Crampel, Alphonse Ricard, La Favorite, and Beauté de Poitevine are also recommended for house culture.

OTTAWA.

Chrysanthemums in the New Greenhouses, Central Farm, Ottawa, 1915. Photo by Frank T. Shutt.

Cutting beet plant that are in seed, 1915. Photo by M. B. Davis.

Photo by M. B. Davis.

Skinner irrigation plant at Central Experimental Farm in operation.

Photo by M. B. Davis.

Showing difference between Fredericton grown seed and Ottawa grown seed of the same strain.
Ottawa seed marked ×. Fredericton seed marked ✓

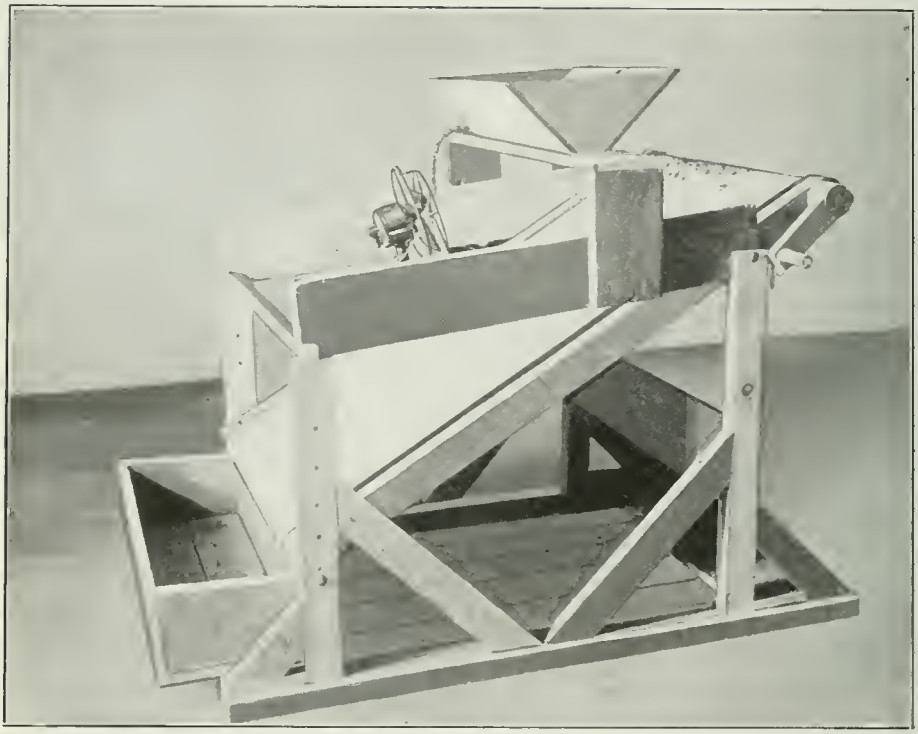


Photo by M. B. Davis.

A home-made seed cleaning machine ; cleans beet, cabbage, turnip, spinach and radish seed.

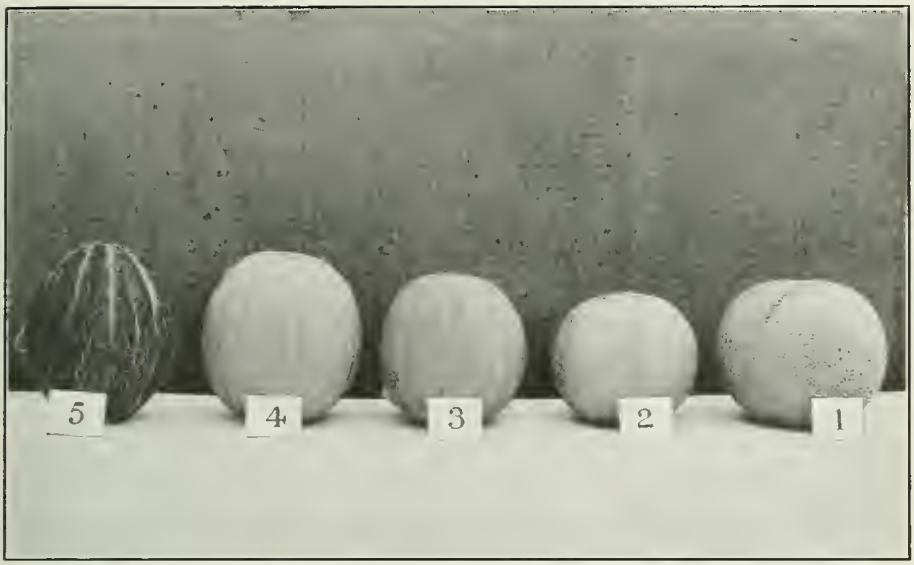
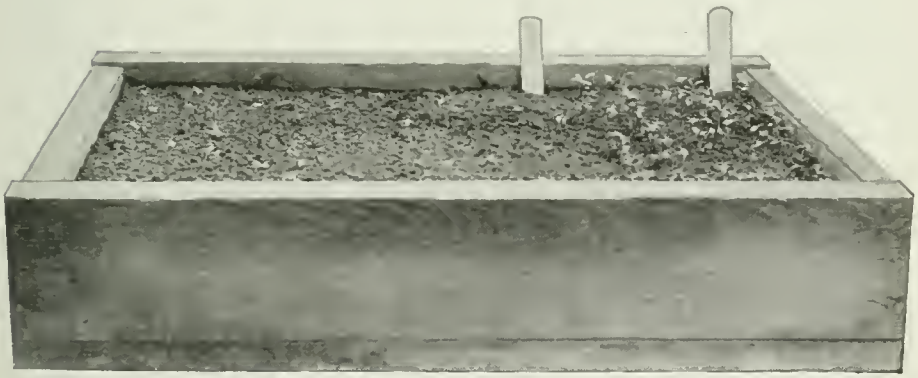


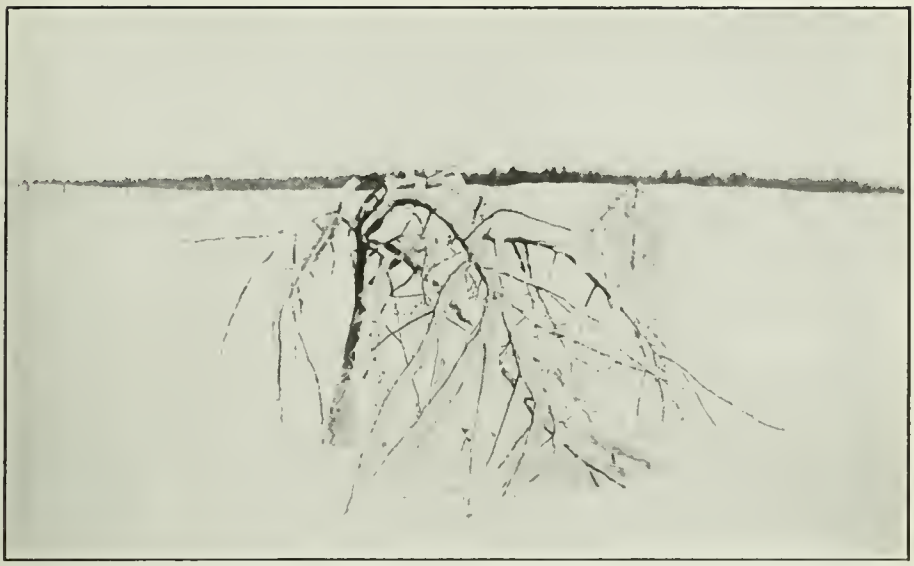
Photo by A. J. Logsdail.

The above photograph illustrates the phenomena of "gradation" so often met with in a number of seedlings of similar origin. The parentage, viz. New Hoodoo▽ crossed with Blenheim Orange△ can be clearly seen in the extreme types. No. 1 resembling Blenheim Orange, No. 5 Hoodoo. Dashes of the dark green skin of No. 5 were to be found appearing through the light silvery green of the more prevalent type. The gradual change in shape from oblate to ovate and the corresponding development of the "netting" from the green type to the oblate silvery green form were clearly noticeable. No gradations were recorded of colour of flesh or flavour, as the dissimilarities were too slight to be able to be recorded accurately.



Cap Rouge, Que. Asters. On the left, commercial seed, on the right, seed grown at Cap Rouge. Grown in Canada should be the motto of the farmer, as made in Canada is the motto of the manufacturer.

Cap Rouge, Que. Selection of potatoes. Each of the two strains comes from a single tuber. Which lot would you rather plant to get a heavy crop?



Cap Rouge, Que. Young apple tree bent down by ice. It was not badly hurt.

Cap Rouge, Que. Vegetables grown between rows of fruit trees.

Brandon: Winter scenes among the Evergreens. Spruce Hedge, an effective wind break.

Brandon: Winter scenes among the Evergreens.

SESSIONAL PAPER No. 16

CHRYSANTHEMUMS.

The chrysanthemum of the greenhouse is *Chrysanthemum hortorum*. It is a large-flowering, autumn-blooming variety of chrysanthemum, and is the product obtained by crossing two wild species from China and Japan. It is a half-hardy plant and in many places completely hardy, and is not, therefore, necessarily a greenhouse plant as it will live over in the perennial border with a little winter protection. As grown in the greenhouse, however, there are many types and these types are separately treated in accordance as experience has shown whether they will best produce small flowers on a bushy plant or large flowers grown to single stems. The large size of greenhouse-grown chrysanthemums, therefore, is due entirely to the special method of handling the plant. In some cases the same variety is grown to a single stem producing one large flower, a plant producing a dozen flowers of medium size, or a bushy plant producing a large number of small flowers.

The sections into which greenhouse-grown chrysanthemums are grouped are given below. The most popular varieties from most of these groups have been tested in the new greenhouses at the Central Farm at Ottawa during the past two years. While the work is not yet advanced enough to give a lengthy article on the chrysanthemum for indoor culture, a list follows in which will be found varieties that have done best during this two year test. The list represents a total of about one-fourth of the number that was tested.

The flowering season of the chrysanthemum commences at Ottawa about the middle of October and lasts until about the end of the year, during which season a good display of chrysanthemums may be seen.

TYPES OF CHRYSANTHEMUMS.

Section 1.—Known as the "Incurved Chrysanthemums." Flowers globular in form and regular in outline.

Section 2.—Known as "Japanese Chrysanthemums". Flowers generally globular in form, but often irregular or flattened. Florets very variable such as flat, fluted, quilled, or tubulated, of varying lengths and in habit incurving, spreading, drooping, or they may be straight and incurved.

Section 3.—Known as "Anemone-flowered Chrysanthemums". They are so called on account of the centre or disk of the flower which is different from the outer or ray florets. The disk florets are generally short and quilled; the ray florets are arranged regularly around the centre disk after the habit of some anemones.

Section 4.—Known as "Pompon Chrysanthemums." Blooms of varying shape, but generally small and always neat and compact. Many flowers to a plant and several flowers to a stem.

Section 5.—Known as "Single Chrysanthemums". Flowers of varying sizes but either entirely single or semi-double with the appearance of a single flower. Flowers are of different types.

Section 6.—Known as Spidery, Plumed and Feathery Types. Flowers small or medium size, with an eccentric shape but light and graceful in character.

Best Chrysanthemums Grown at Ottawa 1914-15:—

——	Name.	Colour and type.	Diameter of flowers in inches, grown one flower to a plant.
Whites	Mrs. G. Drabble	Creamy white, large incurving flowers	5¾
	Naomah	Pure white, Japanese incurved	6⅞
	Timothy Eaton	" fine flowers	6⅝
	Wm. Turner	Snow white, incurved flower	8
	Mrs. Swinburne	Creamy white	6¾
	Ursula Griswold	White, long narrow florets	7
Yellows	Aesthetic	Creamy yellow, twisted incurved florets	6¼
	Chrysolora	Clear yellow	7¾
	Ramapo	Bright yellow	8¼
	Daily Mail	Buttery yellow, narrow, incurved florets, large fld.	8¾
	James Fraser	Deep canary yellow	7¼
	Odessa	Bright yellow	7⅜
	Onunda	Cream, large flower	7⅜
	Mrs. Beach	Bright yellow	6½
	A. S. Baldwin	Clear yellow	6¼
	Mrs. G. Lloyd Wigg	Yellow with buff shading, large flower	7⅜
Pinks	Adonis		7½
	Chieftain	Bright pink, incurved flower	6¼
	Etherington		7⅜
	Elberon	Bright pink, light reverse	6¾
	Meudon	Deep pink, large flower, strong grower	9
	Welis Late Pink	Bright Pink	8⅜
	Valerie Greenham	Pink, large flower	7½
Reds, Browns, and Duplex Types	Glenview	Dark red, dwarf grower (florets)	6½
	O. H. Broomhead	Rose pink to red, reflexed	7½
	E. T. Quittenton	Crimson, reflexed florets	8½
	Mrs. H. Turner	Crimson	9
	Gertrude Peers	"	7⅜
	C. H. Totty	Chestnut scarlet	7⅛
		SINGLES.	
Whites	Dorothy Duggan.		
	Anna.		
	Garza.		
Yellows	Kitty Bourne.		
	Mrs. Louis Thompson.		
	Gold Locks.		
	Golden Star.		
Pinks	Ladysmith.		
Reds	Kitty Connell.		
	Jessie Curtis.		

PLANT BREEDING.

(A. J. Logsdail, B.S.A., *Assistant in Charge.*)

Plant breeding can be roughly divided into the two main divisions of that of pure scientific research, and applied or practical scientific work. Pure scientific research can only be carried on by private individuals or institutions especially endowed for such work. Our public institutions must necessarily devote their chief interest to that of applied research, and endeavour to secure practical, and commercially valuable results from the work undertaken, relying for further basic scientific knowledge on those institutions engaged solely in research work

Ottawa.

The practical solution of commercial problems is the chief interest of our Experimental Stations and comprises practically the whole of the plant breeding work at the Central Experimental Farm at the present time. One of our problems is the development of superior "home-grown" seed of a number of vegetable crops, the chief of which at the present time are corn, tomato, garden pea, and bean. As the majority of vegetable seeds are produced in more southerly districts, often in states and countries possessing longer summer seasons than generally is the case in Canada, these seeds are not, therefore, particularly suited to the growing of crops in our own Canadian climate. A certain quantity of this home grown seed has been distributed during the past few seasons, but the amount has recently been considerably increased, and, judging by the reports received during the close of 1915 (which refer to seed grown that season) a still greater distribution is being planned for the future.

The vegetable crops at present receiving the most attention are, tomato, sweet corn, and garden pea. With the first two, exceptional earliness is the primary object; with peas, heavy yield, quality, and size are the chief desiderata. Work is also being carried on with fruits and flowers. The work with fruits is necessarily slow, owing to the long period required for maturity with the majority of tree fruits. In small fruits, results may be obtained more rapidly and at the present time some hundreds of bispecie-hybrids of strawberries are giving promise of valuable results.

It has been customary in previous reports of the work in plant breeding to report the work under the three main headings, pomology, vegetable culture, and floriculture, as it has been found to be the most convenient method of reviewing all the activities of the work undertaken in this branch of horticulture.

POMOLOGY.

Breeding new varieties of apples has been a most important feature of this work at the Central Experimental Farm for many years past, and from time to time descriptions of promising new varieties have been made and a distribution of the best of these has been carried on for some time past. The orchards contain several hundred seedlings, now fruiting, and several hundred more have been added, each season to the nursery stock, for future planting and experimentation.

The objects in view are, in the first place, to obtain an early bearing, heavy yielding and good keeping apple of first-rate quality, that could be added to the class of the Wealthy and Wagener varieties. Although the Wagener is a valuable apple in many fruit-growing sections it is not hardy enough for the more northerly districts, and hardiness is an essential requisite in any variety of commercial apple for this country. It is, moreover, generally conceded, and was particularly emphasized at the recent Fruit Growers' Convention, that the eastern apple sections have several excellent winter varieties, possessing the characteristics of firmness and good quality, but lacking in sufficient colour to compete favourably on the apple markets of the world with other apple-growing districts, colour having been shown to be an important factor in successful commercial marketing. With this object in view, a number of new crosses have been made with the more highly-coloured varieties of apples, together with the best winter varieties, to produce new types to meet this demand.

The second important line of work in apple breeding is the production of new-specie hybrids of exceptional hardiness that may be grown successfully in the more northerly sections of our central western provinces. The late Dr. William Saunders produced a large number of hybrids resulting from crossing *Pyrus baccata,* a small-fruited Siberian species of exceptional hardiness, with *Pyrus Malus,* the commercial orchard apple.

Many of these hybrids of the first and second generation have proved exceptionally hardy, and further crosses and selections have been made in the past by the Dominion

Horticulturist, Mr. W. T. Macoun, and from these, several very promising types have been secured. This work is being further carried on and enlarged, so that it is hoped ultimately a series of varieties may be produced that can be grown successfully despite severe winter conditions in many of the more northerly areas.

During the past season a number of crosses were made with apple varieties, as follows:—

Record Number:

18-29 Crusoe, F. X Cobalt, M.
18-31 Crusoe, F. X Duchess of Oldenburg, M.
18-32 Niobe, F. X Crusoe, M.
18-33 Niobe, F. X Wealthy, M.
18-34 Rosalie, F. X Crusoe, M.
18-35 Rosalie, F. X Wealthy, M.
18-36 Wealthy, F. X McIntosh Red, M.
18-37 Wealthy, F. X Duchess of Oldenburg, M.
18-38 McIntosh Red, F. X Crusoe, M.
18-39 McIntosh Red, F. X Wealthy, M.
18-41 McIntosh Red, F. X Cobalt, M.

(N.B.—The letter F. denotes the female parent, or tree upon which the fruit was produced, and M. the male parent, or tree from which the pollen was secured.)

During the past season an effort was made to ascertain to what extent varieties of apples in the orchards at the Central Experimental Farm might be considered self-fertile. With this object in view a number of varieties were pollinated with their own pollen, and the flowers were enclosed in bags. In some instances these flowers were emasculated and then pollinated by hand; in others the flowers were merely enclosed in bags, being periodically shaken, with the object of covering the pistils of these flowers with their own pollen. The following is a table giving the results of this work. Three counts were made of the number of fruits set; the first about three weeks after flowering, the second early in August and the third at the time of harvesting.

SELF-FERTILITY TESTS.

Variety.	No. of Blossoms.	Nature of Pollen.	1st Count.	2nd Count.	Fruit Harvested.
Eve (*P. baccata hybrid*)	53	Dry.	0	0	0
Robin (*P. baccata hybrid*)	61	Dry	0	0	0
Haas	121	Fresh	0	0	0
"	94	Dry	0	0	0
"	215	Dry	1·4	1·4	0
"	148	Fresh	1·3	1·3	1
Milwaukee	83	Dry	0	0	0
Wealthy	172	Dry	4·6	2·	0
"	72	Fresh	1·3	0	0
Duchess of Oldenburg	755	Dry	20·6	0	0
"	224	Dry	11·1	0	0
"	764	Fresh	0	0	0
Scott Winter	65	Fresh	29·3	9·6	6
"	38	Dry	29	15·	5
Hibernal	350	Fresh	·8	0	0
Charlamoff	363	Dry	0	0	0
Ostrakoff	380	Fresh	·5	0	0
"	288	Dry	1·	1·	1
Plodovitka	204	Dry	0	0	0
Rochelle	493	Dry	·8	0	0
Rome Beauty	176	Fresh	0	0	0
Lowland Raspberry	131	Dry	20·6	1·5	0
"	44	Fresh	17·5	0	0
Martha Crab	101	"	0	0	0
Anisim	98	Dry	0	0	0
Glenton	158	Fresh	6·	1·	0
Bingo	55	"	0	0	0
Salome Seedling R. 20–T. 40	320	"	0	0	0
Salome Seedling, R. 22–T. 49	259	"	1·	1·	1
McIntosh Red	146	"	0	0	0
Gano	318	"	0	0	0
Gideon	981	"	·3	0	0
Lawver Seedling R. 19–T. 44	478	"	0	0	0
Cobalt	312	"	0	0	0
Yellow Transparent	605	"	3·9	·9	1
Langford Beauty	299	"	0	0	0
Grandmother	442	Dry	0	0	0
"	227	Fresh	·4	0	0
Antonovka	313	"	8·9	0	0

A number of the varieties employed in the self-fertility tests were also crossed with the pollen of other varieties to test and check the comparative accuracy of the work as far as possible. The following table gives a summary of these results:—

CROSS FERTILITY TESTS.

Variety.	Number of Blossoms.	Pollen Parent.	Pollen.	1st Count.	Fruit harvested.
Eve (*P. baccata hybrid*)	40	Charlamoff	Fresh	4	4
Eve (*P. baccata hybrid*)	23	Wealthy	Dry		20
Robin (*P. baccata hybrid*)	44	Wealthy	Fresh		76
Haas	102	Wealthy	Dry	15	10
Milwaukee	139	Haas	"	25	18
Milwaukee	110	Yellow Transparent	"	13	0
Milwaukee	55	Duchess of Oldenburg	"	23	3
Wealthy	62	Melatosh	"	24	4
Wealthy	179	Duchess of Oldenburg	"	41	10
Duchess of Oldenburg	246	Hiberaal	Dry and poor	20·3	7
"	190	Haas	Dry	46·3	19
Scott Winter	52	Haas	"	30·77	12
Scott Winter	19	McIntosh Red	"	47·3	6
Hibernal	148	Antonovka	Dry and poor	0	0
Hibernal	114	Charlamoff	Dry and poor	0	0
Charlamoff	115	Yellow Transparent	Dry	18·5	6·2
Plodovitka	89	Charlamoff	"	3·4	2·6
Rochelle	71	Rome Beauty	"	16·3	6·5
Yellow Transparent	235	Antonovka	"	4·2	4
"	161	Charlamoff	"	21·9	2·4
Antonovka	197	Yellow Transparent	"	31·9	4·5

The percentage of fruit set was quite low, owing to a number of causes. The help available for this work was not as experienced as it might have been, but from check results the records may be taken as substantially correct, though there may be an instance or two where errors have crept in. The result of the whole work shows that apple varieties in general are self-sterile under most conditions, that is, the results obtained at the Central Experimental Farm are in accord with the results previously obtained at several experiment stations and go to prove the necessity of planting several varieties of apples in an orchard, to act as suitable pollenizers for each other.

Another factor that became apparent in this work was that a large number of the flowers, which originally appeared to have been fertilized and to have set fruit, dropped off at later periods during the season.

The total yield in the orchards was little more than a half crop and conditions for pollination by hand were not at all satisfactory. Nevertheless, despite these drawbacks, the results obtained, as shown in the two previous tables, are markedly different.

PEARS.

The work with pears during the past year has consisted in making further crosses between the varieties of Russian origin, now growing in the orchards at the Central Experimental Farm, and commercial varieties of pears from the more southerly districts. The Russian varieties are hardy and blight-resistant, but otherwise much inferior to the average commercial pear. Pear growing in this country is so severely handicapped by a Pear Blight that the object of this work is to secure, if possible, new varieties as resistant to Pear Blight, as are those of Russian origin, and possessing at

the same time the edible qualities of the commercial pear. The seedlings resulting from last year's work germinated very satisfactorily and are now growing in the seed beds.

GRAPES.

A large number of young grape seedlings have been growing at the Experimental Farm, but, owing to the very limited space available for growing these, the majority of them were sent to the new Experimental Farm at Lennoxville, Quebec, where sufficient room for their full development could be obtained and where correct records might be secured of their hardiness.

The seedlings were produced from seed of the following varieties of pure Labruscan origin namely, Moore Early, Concord, Worden, Vergennes and Champion and from varieties of hybrid composition, having as their parentage Labrusca and Vinifera origin, such as Campbell Early, Brighton, Niagara, Salem and Daisy.

During the past season the young seedlings have grown satisfactorily. The seedlings from some parents have shown a markedly greater vigour than those from other stock.

GOOSEBERRIES.

During the past few years a number of gooseberry seedlings have been grown, these seedlings resulting from former crosses between *Ribes Cynosbati* and *Ribes oxyacanthoides* with *Ribes Grossularia*. These seedlings are three years old and the majority of them fruited during the past season; amongst them were one or two plants that were considered of sufficient value for further trial and breeding work, but a large majority of them were similar to the wild parent types in fruit characters.

STRAWBERRIES.

During the season of 1914 a number of crosses were made between several of our most satisfactory commercial varieties and several of our more common native species, a collection of native species having been made the season before and characteristic types isolated. From these crosses a good deal of seed was obtained and immediately sown in a seed bed. Young plants soon began to appear and as their size permitted, they were pricked off and then potted and grown throughout the entire winter, and were large enough for field planting in the spring of 1915. Some hundreds of these varieties are now being grown in the field in the hill system. A few of them have flowered during the season of 1915 and give promise of producing valuable results. All of this plantation should fruit during the summer of 1916. A large number are also being grown under glass for future breeding work.

The object in view is to secure, if possible, new series of strawberry varieties, possessing vigour, hardiness and heavy bearing qualities together with the sweetness and flavour so well known in the small wild species.

VEGETABLE BREEDING.

TOMATOES

During the past few years an effort has been made to isolate and establish a variety of tomato that would mature a large proportion of its crop in the first four weeks from the commencement of the tomato season. It had been found by experiment that many of our early varieties of tomatoes came into bearing very gradually and often produced no more than five or six per cent of their total crop during the first four weeks of fruiting from the time of picking the first ripe fruit. A strain that has been named Alacrity has shown a marked tendency to the production of a large proportion of its crop early in the fruiting season. During the summer of 1915

the best strains that had previously been selected from those varieties were tested in plots of 100 plants to each. The following table gives a brief summary of the results of this work:—

Record No.	Variety.	Percentage Yield of 1st two weeks.	Percentage Yield of 2nd two weeks.	Average Yield per plant.	
		lb.	lb.	lb.	oz.
23-111	Earliest on Earth	8·2	91·8	8	4
23-121	Alacrity	15·8	84·2	10	7
23-131	"	7·5	92·5	9	7
23-141	"	6·9	93	9	6
23-151	"	13·3	86·7	9	5
23-161	Chalk Early Jewel	5·2	94·8	9	
23-231	Alacrity	10 7	89·3	10	3
23-241	"	8·2	91·8	10	2
23-251	"	11·9	88·1	9	2

It will be seen from the above results that the strains of Alacrity have matured a greater proportion of their crop in the first two weeks than either of the other early varieties under trial, and though a record was only kept of the yield for the first four weeks, it will be seen that up to the end of this time the Alacrity strains yielded considerably more per plant than the early selections of the other two recorded strains. Plants of the four best strains of Alacrity were grown separately and a careful record kept of the yield of each individual plant of these strains. It was found amongst the plants chosen for this individual plant selection, that there were some that showed a very marked tendency to produce a large, early crop, some individual plants yielding as much as 17 pounds 7 ounces in the first four weeks of fruiting.

In order that an idea may be obtained of the methods employed in this individual plant selection work, a table is given, containing the results of the individual plant yields from one of the six strains grown during the past season, and the plants selected from these strains for future breeding work are given:—

Plant No.	Yield from Aug. 11th to Aug. 24th.		Total Crop for one month.		No. of Fruits.	No. of unmarketable fruits.	Average weight of fruits.
	lb.	oz.	lb.	oz.			oz.
1	1	7	5	1	21	2	4·0
2		13	8	6	31	2	4·3
3	2	8	13	13	46	1	4·8
4	3	3	9	12	31	1	5·0
5	4	10	12	9	39	2	5·1
6	1	3	7	9	27	1	4·4
7	4	3	12	12	42	4	4·8
8	4	15	11	13	35	3	5·4
*9	6	9	17	1	47	0	5·8
10	4	10	14		49	6	4·5
11	3	5	12	7	34	0	6·6
12	3	4	9	13	31	0	5·0
*13	6	12	17	7	50	1	5·5
14	5	9	9	8	28	1	5·4
*15	7	7	11	12	38	3	4·9
16	5	7	10		36	1	4·4
17	4	4	11	1	38	1	4·6
18	4	11	14	6	46	3	5·0
19	2	10	7	12	27	4	4·5
*20	4	10	14	13	45	0	5·2
21	5	3	11	3	37	5	4·8
22	3	6	8	5	29	4	4·5
23	2	8	9	8	32	0	4·7
*24	7	2	16	5	47	0	5·5
*25	6	14	14	15	41	2	5·7
26	3	13	10	3	30	1	5·4

In the above table the following numbers have been selected as plants most desirable for future breeding work, namely, No. 13, No. 9, No. 24, No. 20, No. 15, and No. 25. It will be seen that there are several plants in the above table that give a better yield than plant No. 15, but it was chosen on account of the large proportion of fruit matured in the earliest part of the season, namely, 7 pounds 7 ounces of marketable fruit was picked before August 24. Similar work was carried on with the other strains and plants have been selected from these. By this means it is hoped ultimately to secure a very early yielding strain of tomato.

A quantity of seed amounting to about 15 pounds has been secured from our own plants this season. This seed has been distributed to experimenters throughout the country for trial, and a large proportion of the reports, so far received, speak very favourably of this new strain.

SWEET CORN.

During the past season seed of corn crosses made during the summers of 1914 and 1913 were tested and isolation and selection employed in an endeavour to secure particular types of an early bearing sweet corn of good quality. The earliest bearing sweet corn now grown at the Central Farm has proved to be Early Malcolm, an extraction from Early Malakoff, a sweet corn of Russian origin. A number of crosses were made between Early Malcolm and White Early Adams (a Dent corn), and White Squaw (an aboriginal, flint corn, dwarf in habit, but extremely vigorous and early bearing). From these crosses a number of new types have been obtained and it is hoped that some of considerable commercial value may be isolated and established from this selection of hybrids.

The following table gives the comparative characteristics of these hybrids; with regard to this table a few explanatory notes will be of assistance to those interested in corn breeding and corn selection.

The term "nubbin" refers to unmarketable ears of five inches in length and under.

The "Ear Row Ratio" denotes the number of ears of eight rows of kernels, ten rows, twelve rows, fourteen rows, or sixteen rows of kernels, harvested in a given row of 100 feet in length of each strain.

The column under the heading of "Ear Length" gives three numbers to each strain, the first denoting the number of ears over seven inches in length from kernel to kernel, the second seven to six, the third six to five.

—	Origin.	Nature of Crop.	No. of Ears.	Wt. of Ears.	No. of Nubbins.	Wt. of Nubbins.	Total Crop.	Ear Row Ratio					Ear Length.		
								Rowed 8—10	Rowed 12	Rowed 14	Rowed 16	Rowed	Ear 5—6"	Ear 6—7"	Ear 7" and over
2571	Early Adams X Early Malcolm	All wrinkled Sweet	60	368 oz.	52	112 oz.	480 oz.	5	8	29	6	0	37	11	0
2572	" "	" "	65	375 "	38	106 "	481 "	6	17	35	4	0	49	17	1
2573	" "	" "	59	368 "	41	104 "	472 "	9	15	34	1	0	37	20	2
2575	" "	" "	53	366 "	45	104 "	470 "	3	5	29	4	1	30	12	0
2577	" "	" "	56	368 "	42	101 "	469 "	2	5	29	5	0	31	9	1
2579	" "	" "	92	460 "	27	64 "	524 "	21	27	30	2	0	47	33	0
2574	" "	Wrinkled 82%. Dent, 18%	68	399 "	23	52 "	551 "	4	4	31	10	3	16	32	4
2576	" "	Wrinkled 20%. Dent, 80%	52	384 "	25	85 "	469 "	4	7	34	7	2	24	26	4
2578	" "	Dent, Flint & wrinkled	54	384 "	22	55 "	439 "	9	11	37	9	0	34	31	3
2580	" "	Dented and wrinkled	68	344 "	19	48 "	392 "								
2581	White Squaw X Early Malcolm	All wrinkled Sweet	115	343 "	48	89 "	432 "						34	19	2
2585	" "	" "	62	308 "	32	58 "	366 "	34	6	7	0	0	31	16	0
2587	" "	" "	52	254 "	60	100 "	354 "	18	3	1	0	0	45	7	0
2589	" "	" "	44	240 "	51	95 "	335 "	33	7	4	0	0	34	10	0
2582	" "	Flint, 76%. Wrinkled 24%	66	348 "	29	62 "	410 "	52	8	6	0	0	20	37	9

GARDEN PEA.

A considerable amount of work has been devoted to the improvement of many of our best known varieties of garden pea. The method employed has been that of rigid selection and then isolation of the desirable types. It has been found that a marked improvement has been obtained from the stock originally chosen to work with. Each season some of the original stock, upon which no selection work has been attempted, is grown as a check beside the new strains.

The season of 1913 was not a satisfactory pea season; 1914 proved to be an exceptionally good year, and the early part of 1915 was all that could be desired for the growing of a pea crop, but the heavy rains towards the end of the season greatly retarded the maturity of the crop, and a considerable quantity of seed was lost by shelling out. Attempts were made to reduce this loss to a minimum but, nevertheless, the ultimate results were undoubtedly affected by these conditions.

The following table shows the comparative yields for a number of strains of several varieties for the past three years. In each instance the amount of seed sown was the same, the cultural and soil conditions as nearly identical as it was possible to make them, and yet it will be noted that though the season of 1915 was not a satisfactory season for a pea crop, the average yields are considerably higher than those of 1913, though somewhat below those of the previous year 1914.

Record No.	Variety.	Yield 1913.	Yield 1914.	Yield 1915.
		oz.	oz.	oz.
311	English Wonder	19·7	69	60
312	"	19·7	69	45
321	"	20·2	71	56
322	"	20·2	71	60
331	"	18	74	60
341	"	19·1	80	65
342	"	19·1	80	50
351	"	19·1	78	61
352	"	19·1	78	65
353	"	19·1	78	70
354	"	19·1	78	70
361	"	6·6	81	66
362	"	6·6	81·5	68
363	"	6·2	81·5	70
364	"	6·1	81·5	63
371	American Wonder	18·4	70	71
372	"	18·4	70	65
373	"	18·4	70	71
374	"	18·4	70	60
375	"	18·4	70	72
376	"	18·4	70	62
381	"	18·4	59	73
411	McLean Advancer	22	88	60
421	"	22	75	56
422	"	22	75	72
423	"	22	75	78
424	"	22	75	67
425	"	22	75	78
431	"	17·5	59	64
432	"	17·5	59	62
441	Stratagem	17·6	63	67
442	"	17	56	76
443	"	17	51	69
444	"	17	49	67
445	"	17	44	65
446	"	17	55	77
447	"	17	55	74

It will be noted in the above table that Stratagem, the latest maturing variety of those mentioned, shows a considerable increase in crop over that of either of the two preceding seasons. It is interesting to note that during the extremely wet weather experienced last summer, the injury to the pea crops was more particularly done to those varieties that were nearing maturity at that time. The Stratagem was comparatively uninjured. It, therefore, seems reasonable to suppose that the lighter yields of the other varieties during 1915, as compared to 1914 were, in no small measure, due to climatic conditions.

BEANS.

A certain amount of selection has been done in seasons past with beans, but the crop proved a total failure, owing to Bean Anthracnose (*Colletotrichum lindenmuthianum*). The setback has emphasized the importance of the fact that the most urgent work with beans, now needing attention, must be that of developing rust-proof varieties. With this object in view, a number of individual plants were chosen from varieties that showed a decided ability to withstand the ravages of this disease.

There is a large field ot work requiring urgent attention: such crops as potatoes, onion, and cabbage offer many possibilities of improvement. Perhaps the most important of these mentioned is potatoes, but little can be done in this line of work at Ottawa, as it has been found by past experience that the climate, or length of season, is not suitable to the continued growing of any strain of potato from its own seed; such a policy has shown that varieties, in this district, lose vitality and vigour and become particularly susceptible to the diseases most commonly found attacking the potato.

FLORICULTURE.

Aquilegia.—In the spring of 1915, further selections were made of the best types of Aquilegia with a view of securing those of perennial rather than biennial habit. A number of crosses were made by hand of the most desirable types, and when the seed matured some six weeks later it was immediately sown, and a good germination of young plants was secured. The Aquilegia, as has been pointed out before, is so eminently suitable for a national flower that efforts are being made to popularize it. It is perennial in habit, and vigorous in growth under a great variety of conditions. There are several native species or sub-species and it is certainly one of the most beautiful spring and early summer flowers that are to be found in garden or woodland, the flowers being graceful in form and ranging in shades from deep rose-red through shades of orange and pink to a deep violet blue. The only colour not yet secured amongst the new strains is that of a bright crimson, but there is, perhaps, no plant that can be grown so easily and, at the same time will respond so readily to careful treatment.

Considerable work has been done with Aquilegia under glass. A number of the most promising seedlings have been grown in pots during the latter part of the summer of 1915. These were saved for forcing under glass and have produced during the month of March a very satisfactory display of flowers, amongst which have been isolated some notably beautiful plants of the "stellata" type. Further crosses have been made with this type with the hope of securing shades of colour amongst them that have not so far appeared.

Roses.—During the summer of 1914 several attempts were made in crossing roses, to secure new types of hardy hybrids, but climatic conditions were unfavourable and seed was scantily produced from the crosses made. Nevertheless a few germinated and grew successfully during the past season, and are now receiving care with other stock in the nursery rows.

During 1915 a number of further crosses were made, and a certain amount of seed secured from them, the object being to secure, if possible, new types of the very

attractive and hardy *Rosa rugosa* hybrids, the well-known Japanese or Chinese bush rose.

Geraniums.—A certain amount of crossing has been done with geraniums, and several seedlings have been secured that are considered of sufficient merit to name and propagate. The types of geranium chosen for this work are the large singles introduced within the last few years, such as Dublin, Shelley, and Chatsworth.

During the past season a number of seedling geraniums, the results of previous hand pollination between chosen varieties, have been grown. About one hundred of these have flowered, many of which have proved very promising, the three best having been named.

No. 3,177, a cross between Dublin, F. and Chatsworth, M., has been named "Verdun". It is a single, large-flowered variety of a bright, crimson colour, the long and strong flower stalk surmounted by a large cluster of flowers; a vigorous grower, free flowering and the leaves are marked with a slight zonal.

No. 3,106, a cross between Dublin, F. and Chatsworth, M., has been named "Sir Douglas Haig." In colour it is of a rich carmine red, has a large, single flower and the flower stalks are tall and strong, producing a large flower cluster. The foliage shows a slight zonal.

No. 3,173, also a cross of Dublin, F. and Chatsworth, M., has been named "Elspeth" and is a large, single, salmon pink, borne on a strong and tall flower stalk. The plant is a vigorous grower, foliage marked by a clear zonal and has proved to be free flowering.

These new varieties are being propagated together with some of the best of those that have not yet been considered worthy of name, and from these a number of new seedlings are now being grown, the result of intercrossing between the promising strains now secured. It is hoped to flower the majority of these during the coming summer, and further promising types are looked for with confidence.

Petunias.—An interesting line of work has been undertaken with petunias, the economic object of the work being to secure new garden varieties of merit, but other objects of interest soon began to manifest themselves. Parent varieties for this work were the free-flowering, single, white, possessing yellow pollen; a free flowering, small single, deep maroon, with steel-blue pollen; and a large double, white, yielding little pollen, but what there was consisted of a creamy white colour. Reciprocal crosses were made between these parents and a large number of the F1 plants were grown and flowered in the field during 1915. The majority of these seedlings in general plant character appeared to resemble the female parent. In colour of corolla no definite tendency towards either parent could be determined, as a great majority of plants produced an ugly reddish-blue corolla in no way resembling either parent, though plants possessing white flowers were more numerous than those possessing the deep maroon.

The chief point of interest was to be observed in the behaviour of the pollen of these seedlings. The yellow pollen crossed with the steel-blue or the steel-blue crossed with the yellow gave in each instance, several, though not a large proportion of plants, yielding distinctly green pollen. The appearance of the crossed pollen did not necessarily coincide with the blending of the corolla colours, that, is, the green pollen was not necessarily associated with the bluish-red corolla, and in these first generation seedlings the appearance of white, bluish-red or deep maroon corolla seemed to be inherited quite independently of the appearance of a yellow, green, or steel-blue pollen. Instances were found of all the combinations, except white corolla with green pollen, and even this might have been found, had the numbers grown been greater.

This work is being carried on, several types discovered being selfed and several crosses have been made between these types, with the object of determining, if possible, any facts relating to the problem in hand.

OTTAWA.

SEED DISTRIBUTION.

In the plant-breeding work there is necessarily produced a quantity of seed of first-class quality, for which there is no room for sowing, owing to the limited area available for this work. It was, therefore, considered advisable to distribute this seed to individuals who might be interested and desirous of trying any new products that were being put out. The seed sent out has been very favourably received and, as a consequence, demands for samples have considerably increased in number.

Two of the most important varieties of seed sent out have been an early table corn, known as Early Malcolm, and an exceptionally early-cropping tomato named Alacrity. These varieties have been so favourably received that a number of the largest Canadian seed houses are now cataloguing them for sale under very favourable comments. Dupuy & Ferguson, seedsmen, Jacques Cartier Square, Montreal, describe the Early Malcolm as "A distinct and valuable addition to the earliest sweet corns. It is very sweet, juicy and tender. It is extremely early and is ready to use from six to ten days sooner than an other sweet corn grown, and is larger than any of the earliest or medium early varieties. Early Malcolm sweet corn is especially adapted for planting in our northern latitudes." The McKenzie Company, seedsmen, of Brandon, Manitoba, offer Early Malcolm as a new novelty, its chief recommendation being its extreme earliness. The Normal School, Brandon, reports it as "ten days earlier than any other variety tested by them."

The Alacrity tomato is equally favourably commented upon by these firms, the McKenzie Company advertising it as "A genuine Canadian introduction," and emphasizes its chief points as earliness, productiveness and quality, whereas Dupuy & Ferguson advertise it as "the earliest red tomato, ten days earlier than any other strain." The prices asked for the seed are a flattering criterion of its estimated worth, the noted strain of tomato known as Langdon's Northern Adirondack being quoted at 80 cents an ounce and that of Alacrity at $1.50.

The following is a tabulated record of the results from reports received from experimenters throughout the Dominion, who have grown, during the past year, seed distributed by the Horticultural Division of the Central Experimental Farm.

SUMMARY OF REPORTS FROM SEED EXPERIMENTERS.

EARLY MALCOLM SWEET CORN.

Province.	Favourable.	Not favourable.	Drought	Frost.	Accident.	Total.
Prince Edward Island	10	5	0	0	0	15
Nova Scotia	6	1	0	1	0	8
Quebec	65	11	7	3	0	86
Ontario	38	7	0	4	0	49
Manitoba	7	2	0	13	0	22
Alberta	12	4	0	5	3	24
Saskatchewan	16	1	0	21	0	38
British Columbia	29	3	0	6	2	40
Total						282

ALACRITY TOMATO.

Prince Edward Island and New Brunswick	12	3	0	0	0	15
Nova Scotia	6	1	0	0	1	8
Quebec	74	6	4	2	2	88
Ontario	28	9	2	4	1	44
Manitoba	9	1	0	12	0	22
Saskatchewan	17	0	0	14	2	33
Alberta	21	1	0	3	1	26
British Columbia	32	4	0	3	1	40
Total						276

Breeding is, at this time, the most important field of work at all large centres of agricultural education and research. The stock-man realized the significance of careful breeding, before it began seriously to be considered in other branches of agriculture, but recent energy has tended to emphasise its importance to all branches.

Plant breeding in the field of horticulture has developed very rapidly within the past decade, and to-day, it comprises in many institutions, the basis of their existence. The recent and very rapid development of this phase of horticulture is the natural sequence arising from the expansion and differentiation of scientific agricultural research.

Applied entomology now deals with many problems formerly within the field of the horticulturist, the agricultural chemist is similarly engaged in bringing to bear an expert knowledge on problems with relation to soil and nutrition. Variety testing is narrowing down as the result of the work of past years, and the consequent elimination of many so-called varieties. Yet, despite all this, there is not a variety that can be considered perfect or even nearly perfect, for any crop grown, (that is, judging merely from the qualities now in existence and evident in almost any collection of varieties). The essential object of plant breeding, therefore, is to collect and combine these scattered characteristics and qualities, and secure, if possible, combinations of them more suitable to commercial purposes.

This closes the report of the work in Plant Breeding at the Central Experimental Farm for the year 1915, but in conclusion it might be pointed out that the basic object of this work is to improve stock of existing varieties and secure, if possible, improved new varieties. At a time like this, this work is of special importance in the field of seed production, but owing to the limited space now available, expansion along the present urgently called for work of seed production is necessarily limited, and it is hoped that in the near future the production of varieties of improved seed in considerable quantity may become one of the main objects, if not the chief one, of this field of work.

OTTAWA.

EXPERIMENTAL STATION FOR PRINCE EDWARD ISLAND, CHARLOTTETOWN.

REPORT OF THE SUPERINTENDENT, J. A. CLARK, B.S.A.

This is the seventh annual report on the horticultural work at this Station since its inception in 1909. The work accomplished would indicate that this province is admirably situated for the production of small fruits and garden vegetables. The backward spring holds back bloom generally until danger from frost is over. The moist, moderate temperatures are ideal for large crops of first quality fruit and the long open autumn gives the slow growing vegetables an opportunity to mature. After a careful study of results obtained from the many tests of varieties it was decided to reduce the number of variety tests by cutting out unsatisfactory varieties and to start a series of cultural tests with many of the leading vegetables in order to determine the best methods of cultivation and care of the several vegetables and tubers.

SEASONAL NOTES.

The winter of 1914-15 was unseasonably mild, the frost coming out of the ground entirely in both January and February. Two cold waves occurred; one at Christmas and one at the beginning of February, but they lasted only a few days. Heavy falls of snow occurred in March and gave splendid protection to the fruits, shrubs and perennials. Very little rain fell in April but May was so wet and cold that growth was slow, while large bodies of ice along the shores kept the air cool and raw. The hotbeds were sown April 15, sweet peas were sown outside April 23, and hardy vegetables were sown May 18. The trees did not appear green until May 27, but no June frost occurred, and the months of June and July were ideal, all plants making wonderfully rapid growth during this period. Beneficial showers occurred from June 9 to 25. A heavy gale did much damage in some places on July 9, destroying the foliage on exposed trees and killing, outright, several acres of strawberries along an exposed shore just as the crop was ripening. The fruit did not set well on the larger trees, probably due to a continued dull wet spell of weather that occurred while the trees were in bloom. August was seasonable, and September was very dry and the potatoes and vegetables suffered somewhat from drought. October and November were fine. December was very open, ploughing continuing to the 27th of the month. January and the first half of February were mild, with fair sleighing, but the last half of February and March were very blustery and stormy. Sixty-six inches of snow fell during March alone.

CHARLOTTETOWN.

Some Weather Observations taken at Charlottetown Experimental Station, 1915.

Month.	Temperature F.			Precipitation.				Total Sunshine.
	Max.	Min.	Mean.	Rainfall.	Snowfall.	Total.	Heaviest in 24 hrs.	
	°	°	°	Inches.	Inches.	Inches.	Inches.	Hours.
January	48	14	21·58	2·62	27	5·32	1·05	72·4
February	49	13	22·624	1·54	8	2·34	·58	94·6
March	45	10	25·774	.....	23·5	2·35	·5	86·4
April	57	20	37·55	1·80	7·	2·5	·4	140·9
May	68	31	44·742	3·97	.....	3·97	1·09	160·1
June	77	35	54·767	3·13	.....	3·13	·79	195·5
July	81	42	63·645	1·95	.....	1·95	·7	238·9
August	81	42	63·645	2·22	.....	2·22	·62	203·3
September	80	35	57·233	3·98	.....	3·98	·9	169·9
October	67	31	47·667	3·83	.....	3·83	1·66	145·1
November	54	21	38·48	4·51	.....	4·51	1·19	58·6
December	50	11	29·71	6·04	13·1	7·35	1·77	48·1
Total for year				35·59	78·6	43·45	.....	1613·8
Average for seven years				32·73	101·81	42·87	.....	1865·5
Total for six growing months, April to September				17·05	7·	17·75	.....	1108·6
Average for six years, for six growing months, April to September				17·71	11·25	18·83	.....	1269·8

HORTICULTURAL AREA.

The land and grounds devoted to horticulture including wood lots and avenues, is about 24 acres. Further time was spent in fixing up these wood lots and shelter belts so that the white birches should have the prominence they deserve, as some of our most beautiful trees.

LARGE FRUITS.

APPLES.

The following varieties set out in 1910 began bearing fruit in 1915: Ontario, Northwestern Greening, Ribston Pippin, Langford Beauty and the Hyslop crab tree. The trees were sprayed while dormant, just as the buds showed signs of breaking, and twice with the summer-strength lime-sulphur spray. A power sprayer was used and insects and fungous diseases controlled. A medium crop of clean fruit was harvested from the old orchard. The fruit on the Red Astrachan made very poor growth and never acquired its usual flavor. The growth of the new apple orchard has been slow, probably due to the heavy clay hard pan that underlies that section of the orchard.

CHERRIES.

The cherries were more than a week later in blooming in 1915 than in 1913, when they were three or four days earlier than in 1914. The trees have made a splendid growth and bloomed fairly well. Almost every tree bore some fruit and a number bore a fair amount, but the birds took it before it matured. The trees have remained free from fungous diseases except a few cases of crotch canker.

PLUMS.

This year (1915) proved to be an off-year with plums at this Station. The trees bloomed fairly well but did not set. Smith Orleans and Purple Egg were the only two that bore anything worth while.

PEARS.

The pear orchard has made much more rapid growth than the other fruit trees set out in 1910. The trees were sprayed and made good growth in 1915, but did not produce any fruit.

As it was desirable to use the land where the pear orchard stood for other purposes, the entire orchard was moved late in December to a new location on the Johnson property north-east of the Experimental Station buildings. The ground was laid off early in December and the holes for the trees dug large and two feet deep. A trench was dug about the trees some eighteen to twenty inches from the trunk and, as the ground froze, the trench was deepened until the ball of earth was frozen solid and contained most of the roots of the tree. A drag sleigh was used and four trees were removed at a time. During a mild spell of weather afterwards the clay was packed about the frozen ball so as to prevent drying out in the spring.

SMALL FRUITS.

GRAPES.

The late season and the leaving of the earth over the grape vines late in the season so retarded the grapes that only a few bunches of Winchell and Moyer matured so that they could be used. The yield of all varieties was very light.

CURRANTS.

The crop of black currants was very little better than the previous year. It was found that the currant stem borer was responsible for much of the injury. The red and white currants gave large yields of excellent fruit. The green aphis that has been troublesome other years was controlled by the use of "Black Leaf 40." The following varieties in order gave the largest yields: Black—Ontario, Kerry, Kentish Hero and Ethel. Red—Knight Large Red, Wilder, Greenfield and Benwell. White—White Grape, Large White and Verrieres White.

GOOSEBERRIES.

The gooseberries were kept clean with a mulch from the strawberries. They were sprayed and produced a heavy crop of excellent fruit. The following varieties gave the largest yield in order mentioned: May Duke, Houghton, Downing and Industry.

RASPBERRIES.

The raspberry season of 1915 extended from August 5 to September 3. This fruit is always in demand and prices remained good throughout the season.

The average yield for four years of the leading varieties will be found in the following table:—

TEST of Varieties of Raspberries.

Variety	Colour.	First ripe fruit.	Size of fruit.	Average No. of pickings.	Average of 4 years. Yield per acre.
					Lb.
Shaffer	Purple	July 27	Large	9	2,384
Loudon	Red	" 17	Medium	9	2,850
Herbert	Red	" 17	Large	9	1,628
Cuthbert	Red	" 18	Large	8	1,579
Columbian	Purple	" 29	Large	8	1,556
Golden Queen	White	" 18	Medium	7	955

STRAWBERRIES.

The twelve seedling varieties received from Ottawa in 1914 made vigorous growth and fruited well in 1915. The yield per acre in boxes of the four heaviest yielding varieties is given in the following table:—

TEST of Seedling Varieties.

Variety.	Size.	First ripe fruit.	No. of pickings.	Yield per acre.
				Quarts.
Portia	Large	July 18	8	4,901
Valeria	Large	" 16	7	4,719
Julia	Small	" 15	9	3,895
Mariana	Large	" 15	8	3,812

Twenty-six other varieties were grown. The plantation of 1914 was badly winter-killed and the records here given of the leading three varieties are taken from the plantation set out in 1913:—

Variety.	Size.	First ripe fruit.	No. of pickings.	Yield per acre.
				Quarts.
Parker Earle	Large	July 16	10	4,730
Splendid	Large	" 15	8	3·080
Glen Mary	Large	" 14	7	2,090

A part of this old plantation was weeded early in the season of 1915. The fruit on the portion weeded ripened earlier but the yield was not so good as where the plants were left alone with the winter mulch between the rows.

TREES AND SHRUBS.

The many ornamental trees and shrubs that have been planted on the grounds of the Station and along the roadways made good vigorous growth and produced an abundance of bloom throughout the summer.

LAWNS.

The lawns were rolled as the frost went out in the spring and cut as required throughout the season, the horse-mower being used wherever possible. With the exception of a few areas that were attacked by the white grub the lawns retained a beautiful green matted appearance all summer. The areas affected were somewhat torn up by the birds digging up the grubs. The roots were so badly cut in places that the sod could be rolled as though prepared for moving. We allowed the birds to do their good work. The sod was rolled frequently. This kept the grass alive until the attack was spent. On the lawn between the Superintendent's residence and the barn a grass tennis court has been maintained for several years. The lines are drawn by raising the mower to cut them about one and one-half inches higher than the grass of the court. The appearance is attractive and the lines are always ready for the game. A new lawn was put down about the sweet peas and the new perennial flower border. A thick seeding of oats was sown with the grass seed, giving it a good covering in about two weeks from seeding. By the time the grass was covering the ground the oats were disappearing.

VEGETABLES.

Besides the regular test of varieties of vegetables, plots were sown or planted to cultural experiments in order to get data *re* the best methods of tillage, manuring and training of many of the leading vegetables. We were able to avoid land infested with club-root and the attacks of carrot rust fly and other pests were checked by the use of insecticides.

ASPARAGUS.

The asparagus rust so injured the bed that a new plantation will be set out another year.

BEANS.

Thirteen varieties of beans were planted on June 5. They made splendid growth. Some anthracnose was present. Owing to a spell of wet weather during the harvesting, the records of the yields of varieties were rendered almost-useless.

BEETS.

Five varieties were sown May 18 in rows thirty feet long and thirty inches apart and the plants allowed to just crowd one another in the rows at maturity. The following is the record of the varieties:—

Name.	Fit for use.	Shape.	Quality.	Yield per acre.	
				Bush.	Lb.
Crosby Egyptian	August 6	Turnip	Good	441	20
Cardinal Globe	" 1	Globe	Good	435	30
Ruby Dulcet	" 1	Ball	Good	418	9
New Meteor	" 1	Turnip	Good	348	24
New Early Black Red Ball	" 10	Ball	Good	267	8

BRUSSELS SPROUTS.

One variety, Dwarf Improved, sown June 15, gave a return of 2 tons 1,246 pounds of sprouts per acre.

CABBAGE.

Eleven varieties were tested in 1915. The seed was sown in the hotbed on April 15 and pricked out on May 17. The plants were set out on June 11. The following table gives particulars and yields:—

Name.	Fit for use.	Average weight per head.	Per acre.	
		Lb.	Tons	Lb.
Flat Swedish	September 1	6	22	1,302
Fottler Improved Brunswick	" 2	5	21	108
Danish Summer Ballhead	August 25	6	20	1,818
Nofalt	" 5	4¼	15	1,944
Improved Amager Danish Roundhead	September 2	4¼	14	1,621
Copenhagen Market	August 25	4	13	717
Extra Amager Danish Roundhead	September 4	4	13	717
Danish Stonehead	August 25	3½	12	1,410
Early Jersey Wakefield	" 6	3	11	651
Danish Delicatesse	" 25	3	10	909
Paris Market	" 4	2¾	9	1,166

CAULIFLOWER.

The three varieties of cauliflower only gave fair returns. A few were injured by club-root. The following data were recorded:—

Name.	Fit for use.	Yield per acre.	
		Tons.	Lb.
Danish Giant Dryweather	August 21	3	970
Extra Selected Dwarf Erfurt	" 15	3	98
Early Snowball	" 17	2	1,518

CARROTS.

The records for the carrots were accidentally destroyed. They gave good yields. The injury from Carrot Rust fly was slight. The following list is in order of merit: Half-long Chantenay, Improved Danvers Half-long, Improved Nantes and Early Scarlet Horn.

CELERY.

The celery germinated well but damped off after being pricked out.

CORN.

Ten varieties of corn were planted on June 4, in hills three feet apart each way. The soil was heavy and needed drainage during the season of 1915. There were twelve hills of each variety. The following table gives the dates of maturity and number of ears that were pulled from each lot:—

Name.	Date ready for use.	Yield of plot. Ears.
Early Malcolm	September 15...	74
Early Malakoff	" 15...	67
Early Fordhook	" 15...	64
Early Dawn	" 13...	63
Early Iowa	" 13...	47
Golden Bantam	" 21...	44
Pocahontas Sweet	" 20...	31
Perkins Extra Early Market	" 20...	9
Extra Early Adams	" 20...	6

CUCUMBERS.

The late season was unfavourable for cucumbers. Fordhook Famous was the heaviest yielder and Improved White Spine gave the next best out of the four varieties tested.

EGG PLANT.

The egg plant, though sown on April 15, failed again to mature.

LETTUCE.

The four varieties of lettuce grew well and supplied an abundance of crisp heads. The varieties are named in order of merit: Iceberg, Dreer All Heart, Grand Rapids Forcing, Giant Crystal Head.

MUSKMELON.

The muskmelon seed failed to germinate.

ONIONS.

Seven varieties of onions were sown on May 18. The onion maggot did much damage to the growing plants. Johnson Dark Red Beauty gave the best returns with Giant Red Wethersfield second.

PARSLEY.

The parsley failed to germinate.

PARSNIP.

The Intermediate gave a yield at the rate of 8 tons 525 pounds per acre, and Improved Hollow Crown gave a yield of 5 tons 1,070 pounds per acre. They were sown on May 18 and pulled November 13.

CHARLOTTETOWN.

PEPPERS.

The season was short for peppers which were sown in hotbeds on April 15, but by leaving them in flats and putting them back in the hotbeds in the autumn, we ripened quite a few New Neapolitan, Red Chili, and Long Red Cayenne.

PEAS.

Fifteen varieties of peas were planted May 20, in rows thirty feet long. The rows were three feet apart and the seed was planted one inch apart in the row. One half of each row was picked for green peas and the other half allowed to ripen.

The following table gives the records of each variety when ready for use and in pounds per acre and bushels of seed per acre:—

Name.	Ready for use. Green.	Yield per acre. Green Pods.	Yield per acre. Ripe shelled peas.	
		Lb.	Bush.	Lb.
Advancer	August 5	14,520	96	48
Heroine	" 15	14,036	96	48
Dainty Duchess	" 5	13,552	96	48
Telephone	" 15	13,552	80	40
Quite Content	" 5	13,552	80	40
Stratagem	" 20	12,584	56	28
Premium Gem	" 17	9,680	52	28
Juno	" 12	13,552	48	24
The Lincoln	" 12	13,068	48	24
Thomas Laxton	" 22	9,680	48	24
Early Giant	" 27	8,712	48	24
American Wonder	" 1	7,744	48	24
Gregory Surprise	July 30	7,744	48	24
Sutton Excelsior	August 2	9,680	32	16
Gradus	July 30	4,596	32	16

RADISH.

The Turnip Early Scarlet White Tipped was ready for use in one month and ten days from seeding. It produced at the rate of 8,131 bunches per acre.

SQUASH.

Only four varieties of squash were planted on the 27th of April. The Golden Hubbard was ready for use August 17, the Long Vegetable Marrow August 28, and the Delicious and Crookneck September 17. The Golden Hubbard and the Delicious were superior to the others in quality, for cooking.

TURNIPS.

Eight varieties of table turnips were grown. The seed was sown May 21, and the roots harvested the 13th of November.

POTATOES.

Twenty-three varieties of potatoes were grown in rows 30 inches apart, with the plants 14 inches apart in the row. The seed planted was all from hill selected stock, and it was treated by soaking the uncut tubers for three hours in a solution of one part to two thousand of biehloride of mercury. The potatoes were sprayed regularly with poisoned Bordeaux throughout the season from July 13 to September 11, eight sprayings in all. The potatoes were planted June 5, and were dug October 5. Plot, 1/264 of an acre.

CHARLOTTETOWN.

TEST OF VARIETIES.

No.	Name of variety.	Form and colour.	Yield per acre. Sound.		Marketable.		Unmarketable.	
			Bush.	lb.	Bush.	lb.	Bush.	lb.
1	Table Talk	Oval White	400	24	263	27	136	57
2	American wonder	Long white	356	6	315	58	40	8
3	Bliss Triumph	Round red	355	51	295	54	59	57
4	Burbank Seedling	Long white	342	56	302	30	40	26
5	Dreer Standard	Long white	332	12	305	48	26	24
6	Early Rose	Long red	323	57	274	27	49	30
7	McIntyre	Long blue	323	57	254	6	69	51
8	Late Puritan	Oval white	322	34	277	12	45	22
9	Selina Burbank	Long white	306	54	224	57	81	57
10	Carman No. 1	Oval white	300	19	183	26	116	53
11	Irish Cobbler	Round white	279	57	188	23	91	34
12	Rawlings Kidney	Long white	279	40	215	36	64	4
13	Early White Rose	Long white	267	34	183	9	84	25
14	Green Mountain	Oval white	252	11	176	50	75	21
15	Empire State	Long white	242	17	169	24	72	53
16	California Red	Round red	236	14	193	3	43	11
17	Garnet Chili	Round red	226	36	178	12	48	24
18	Lion Paw	Long white	223	51	187	—	36	51
19	Ashleaf Kidney	Oval white	223	51	143	—	80	51
20	Rochester Rose	Oval red	223	18	186	27	36	51
21	Early Puritan	Oval white	199	21	141	20	58	1
22	Gold Coin	Oval white	196	4	145	12	50	52
23	Wee McGregor	Oval white	150	59	105	53	45	6

SWEDE TURNIPS FOR THE TABLE.

The plants were about 7 inches apart in the rows, the rows 30 inches apart and 30 feet long. The yield per acre was computed from these plots.

Name.	Yield of Plot.	Yield per acre.	
	lb.	Tons.	lb.
Best of All	100	29	80
Carter Invicta	95	27	1,176
Sutton Purple Top	95	27	1,176
Skirving Purple Top	90	26	272
Bangholm Purple Top	85	24	1,368
Hall Westbury	80	23	464
Favorite	75	21	1,560
Westbury Purple Top	70	20	656

SALSIFY.

The Long White Salsify gave a very good yield but the roots were branched so that there was a large amount of waste.

CHARLOTTETOWN.

TOMATOES.

Eleven varieties of tomatoes were grown in hills four feet by four feet apart, five plants of each strain. They were picked and recorded as they ripened. On the 28th of September the balance of all the varieties was picked and sold green. The demand for tomatoes, either ripe or green, is much greater than the supply and the price has been high for several years. Tomatoes need good clean tillage. Manure or fertilizer containing nitrates should be applied very sparingly if the crop is to ripen. It would be much better to manure the land a year or two before planting tomatoes on it. The following were the yields of ripe and green fruit in 1915:—

Name.	Date of first ripe fruit.	Yield of plot.			Yield per acre.	
		Ripe.	Green.	Total.		
		lb.	lb.	lb.	Tons.	lb.
Prosperity	September 16	4½	70	74½	20	565
Alacrity	" 5	11	58	69	18	1,571
Sunnybrook Strain Earliana	" 5	9	54	63	17	304
Mutch Earliana	" 16	4	46	50	13	1,225
Johnson Jack Rose	" 18	3	42	45	12	503
Chalk Early Jewel	" 16	2¼	35	37¼	10	283
Florida Special	" 18	1½	33	34½	9	785
Rennie Earliest Round Scarlet Skin	" 7	5	28	33	8	1,968
Bonny Best	" 16	3½	29	32½	8	1,696
Line Bred Northern Adirondack	" 17	4½	8	12½	3	806
Bolgiano Extra Early		—	2	2		1,089

CULTURAL EXPERIMENTS.

A series of cultural experiments was started in 1915 with a number of the leading vegetables. A few brief notes are here given on the first season's work. Detailed statements will be made after several years' averages have been obtained.

BEANS.

A comparison of the relative advantages of a succession of varieties of different seasons with the same variety planted at intervals of a week apart for four weeks gave returns in favour of sowing early and late varieties at the same time rather than several sowings of one variety.

CABBAGE.

Tests were made with two varieties of cabbage; Early Jersey Wakefield and Copenhagen Market, to determine the best method of protecting them from the root maggot. Tar felt dises were used in comparison with a cheese cloth covering. A check of each variety was planted alongside. The tar felt saved 4 per cent more than grew without protection. The cheese cloth was expensive and greatly injured the growing plants so that they produced less than half the check rows.

CAULIFLOWER.

A similar experiment to the above was tried with cauliflower, using tar felt dises, cheese cloth and checks without protection. The tar felt dises were quite valuable in saving the cauliflower and those protected in this way yielded about one-half more than the check while those protected with cheese cloth produced about one half as much as the check.

CHARLOTTETOWN.

THINNING OF VEGETABLES.

Three 100-foot rows each of beets and parsnips were sown on the 18th of May. The plants in one row of each vegetable were thinned to 2 inches apart, the second row to 3 inches apart, and the third row to 4 inches apart. The result was as follows:—

Vegetable.	Yield per acre when sown.					
	2 in. apart.		3 in. apart.		4 in. apart.	
	Tons.	lb.	Tons.	lb.	Tons.	lb.
Early Model Beet	10	909	9	1,079	10	1,694
Hollow Crown Parsnip	11	1,000	14	227	13	1,704

POTATOES.

An experiment was conducted to determine the best number of eyes to leave in potato sets for planting. Two varieties were used, Early Puritan and Gold Coin. The following table gives the average returns from duplicate plots:—

Kind of sets.	Yield per acre Market-able.		Yield per acre Unmarket-able.		Total yield per acre		Bush. of sets per acre planted.		Yield per acre less amount of sets used for planting.	
	Bush.	lb.	Bush.	lb.	Bush.	lb.	Bush.	lb.	Bush.	lb.
Whole potatoes	132	24	150	42	283	6	48	24	234	42
Sets with 1 eye	135	51	47	18	183	9	18	42	164	27
Sets with 2 eyes	133	6	73	34	206	40	31	54	174	46
Sets with 3 eyes	148	30	89	55	238	25	46	45	191	40
*Check	145	68	48	31	194	39	26	24	168	15

NOTE.—The sets used in the check row contained 1 or 2 good strong eyes.

The land in the above experiment was not as uniform as we would have liked it, as shown by the checks. The above data would indicate that a good large set is more important than one with many eyes in it. A large number of eyes would appear to increase the percentage of small potatoes.

The experiment with planting potatoes at different dates gave the largest return of potatoes from the first planting, May 24. The plantings made on June 1 and June 15 were fairly good. The potatoes planted on June 8 and 24 were poor.

A comparison was made between potatoes cut and coated at once with lime, with sets not so coated and planted the same day. Those limed gave much better returns. A further experiment was tried by treating the sets as above and holding them in the cellar two weeks. The results from this experiment were not so marked. The number of marketable potatoes harvested from the limed sets was greater but the total yield was not so great. The experiments would indicate that lime applied to fresh cut sets is advantageous.

An experiment was conducted to determine the best distances apart for planting potatoes. Two varieties of potatoes were used, one the Early Puritan and the other Green Mountain, for a main crop variety. The sets used had three eyes and the plots were all grown in duplicate. The following table would indicate that with both varieties the rows 30 inches apart and plants 14 inches apart in the row produced the heaviest crop.

CHARLOTTETOWN.

DISTANCE between Rows and between Plants.

Rows.	Plants.	Variety.											
		Early Puritan.						Green Mountain.					
		Marketable. per acre.		Unmarketable. per acre.		Yield per acre. Total.		Marketable. per acre.		Unmarketable. per acre.		Yield per acre. Total.	
In.	In.	Bush.	lb.	Bush.	lb.	Bush.	lb.	Bush.	lb.	Bush.	lb.	Bush.	lb.
30	12	144	6	151	48	295	54	226	11	95	50	322	1
30	14	149	36	154	—	303	36	299	4	92	24	391	28
36	12	138	12	124	26	262	38	191	13	72	11	263	24
36	14	126	55	112	28	239	23	173	22	58	22	232	17

Cost of Growing One Acre of Potatoes.

One half of an acre was planted with Irish Cobbler, an early variety, and another one half acre alongside was planted with Green Mountain, a main crop variety of potatoes. In the following table a record is given of the cost of growing these potatoes:

Details with cost.	Variety.	
	Irish Cobbler.	Green Mountain.
Number of acres	½	½
Rent of land at $3 per acre	$1 50	$1 50
Share of manure at the rate of 25 tons per acre	2 50	2 50
Use of machinery at 60 cents per acre	30	30
10 bushels of seed at 50 cents per bushel	5 00	5 00
Plowing and ribbing, autumn 1914, 2½ hours at 34 cents	85	85
Harrowing in autumn, 2 hours and 36 minutes at 34 cents	97	97
Discing in Spring 37 minutes at 41 cents per hour	25	25
Harrowing in Spring, 1 hour at 34 cents per hour	34	34
Rolling one-third hour at 34 cents per hour	11	11
Cutting sets, 4 hours and 25 minutes labour at 17 cents per hour	75	75
Planting, 1 hour at 34 cents per hour	34	34
Planting 1 hour labour at 17 cents per hour	17	17
Spraying, 1 hour and 10 minutes at 34 cents per hour	40	40
Spray material, 7 applications (poisoned Bordeaux)	2 98	2 98
Hoeing, 5 hours manual labour at 17 cents per hour	85	85
Cultivating, 3 hours at 27 cents per hour	81	81
Cultivating, 2 hours and 20 minutes at 34 cents per hour	80	80
Picking potatoes, 20 hours at 17 cents per hour	3 40	3 40
Digging and harrowing, 1 hour and 17 minutes at 34 cents per hour	44	44
Hauling, 2 hours at 27 cents per hour	54	54
Storing, 7 hours at 17 cents per hour	1 19	1 19
Cost per plot	$24 49	$24 49
Cost per acre	$48 98	48 98
	Bush. lb.	Bush. lb.
Yield of potatoes per plot	128 43	151 10
Yield of potatoes per acre	257 26	302 20
Cost to produce 1 ton of potatoes	$6 47	$5 40
Cost to produce 1 bushel of potatoes	·19·03c.	·16·2c.

TOMATOES.

The cultural work with tomatoes gave much more uniform results and is reported more in detail in the following tables.

EXPERIMENT to determine best method of Growing Tomato Vines to secure Ripe Fruit. Plots 200 square feet, or 1/217.8 acre.

Method.	Varieties.									
	Bonny Best.					Earliana.				
	Date of first ripe fruit	Yield of ripe fruit per plot.	Yield of green fruit per plot.	Total yield per acre.		Date of first ripe fruit	Yield of ripe fruit per plot.	Yield of green fruit per plot.	Total yield per acre.	
	Sept.	lb.	lb.	Tons.	lb.	Sept.	lb.	lb.	Tons.	lb.
Plants allowed to grow unpruned and left lying on the ground in hills 4 feet apart each way.	10	7½	116	13	681	10	87	144	17	1,393
Plants pruned to 1 stem. Planted in rows 4 feet apart and 2 feet apart in the rows. Tied to stakes 5 feet long. Side shoots pinched out. . .	17	20½	68	9	1,274	10	12	33	4	1,801
Plants pruned to 1 stem. Planted in rows 4 feet apart and 2 feet apart in the rows. Tied to wires. 1st, 15 in. from ground. 2nd, 18 in. above 1st. 3rd, 18 in. above 2nd.	17	14½	58	7	483	17	14½	48	6	1,612
Plants pruned to 1 stem. Planted in rows 4 feet apart and 2 feet apart in rows. On stakes with half foliage removed. . . .	17	13	67	8	1,424	17	12	43	5	1,979
Plants pruned to 2 stems and tied to stakes and wire.	17	6	85	9	1,820	21	3	46	5	672

The above results would indicate that tomato plants will produce more fruit if planted four feet apart and allowed to spread out over the ground. The Earliana not only produced more fruit in this way but produced a much greater quantity of ripe fruit.

EXPERIMENT to Determine the Best Method of Ripening Green or Partly Ripe Tomatoes.

Method.	Bonny Best.			Earliana.		
	Rotten.	Ripe.	green.	Rotten.	Ripe.	Green.
	%	%	%	%	%	%
1st— Fruit put in shade in moderately warm place, showing traces of red.	46	27	27	46	18	36
2nd— Fruit put in closed box without ventilation. Fruit green.	28	48	6	24	36	40
3rd— Put in closed box without ventilation. Fruit showing traces of red.	76	12	12	64	16	20
4th— 12 plants hung in moderately warm building. . .	15	0	85	10	1½	88½

The above fruit was picked on September 28, and examined on October 28, 1915.

CHARLOTTETOWN.

ONIONS.

Onions were thinned to 1 inch, 2 inches, and 3 inches in the row. The average yield per acre of the three varieties when thinned to 1 inch was 8,538 pounds per acre; when thinned to 2 inches, 9,060 pounds per acre, and when thinned to 3 inches, 7,492 pounds per acre.

The method of planting was compared as follows: Three varieties were sown in the open on May 18, and thinned to three inches apart. The average yield per acre was 7,492 pounds. The same varieties were sown in the hotbeds on April 15, and transplanted to a distance of 3 inches apart. They gave an average yield of 6,622 pounds per acre. Yellow onion sets were planted May 24, 3 inches apart. They gave a yield at the rate of 8,190 pounds per acre.

Onion sets were grown from three varieties by sowing the seed at the rate of not less than 200 seeds per inch. This crowded the plants so that the sets matured well when one-half to one-quarter inch in diameter.

FLOWERS.

ANNUALS.

The season of 1915 was favourable for most of the annual flowers. The moist season tended to produce large magnificent flowers of the different sorts. The seed obtained in the spring of 1915 was not so good as we have had in former years and quite a number of sorts are omitted from the list of annual flowers as the seed failed to germinate. The aster disease, which turns the leaves and flowers yellow, was not so bad as in former years. The sweet peas were given new ground and rivalled the best we have ever had. A list of the twelve varieties recommended by this Station is here given:—

SWEET PEAS—TWELVE BEST VARIETIES.

Variety.	Colour.	Began to Bloom.
King White	White	July 24.
Rosabelle	Rose	July 23.
Wedgewood	Blue	July 23.
Thos. Stevenson	Orange scarlet	July 24.
Mrs. Townsend	White and blue	July 24.
Maud Holmes	Crimson	July 24.
Mrs. C. W. Breadmore	Cream with buff edge	July 24.
Margaret Atlee	Cream pink	July 24.
R. F. Felton	Lavender	July 25.
King Manoel	Maroon	July 26.
Clara Curtiss	Cream	July 26.
John Ingman	Carmine	July 26.

The above varieties continued blooming until killed by the heavy frosts in October.

CHARLOTTETOWN.

The following statement gives some of the details recorded concerning our annual flowers:—

No. of varieties.	Name.	Date planted under glass.	In bloom.		Remarks.
			From	To	
2	Acroclinium	April 17	June 30	Oct. 20	Excellent.
1	Alonsoa	April 15	July 25	Oct. 25	Fair.
1	Arctotis	April 17	July 23	Sept. 20	Good.
31	Aster	April 15	Aug. 15	Oct. 11	Good.
1	Balsam	April 24	Aug. 11	Oct. 2	Fair.
2	Calendula	April 24	July 11	Oct. 20	Excellent.
3	Candytuft	April 15	July 8	Oct. 20	Good.
1	Castor Oil Plant	April 19	July 15	Nov. 1	Excellent.
1	Carnation	April 15	Aug. 30	Sept. 20	Fair.
1	Celosia	April 15			No bloom.
1	Centranthus	June 7	Aug. 20	Oct. 20	Good.
3	Chrysanthemum	April 15	July 1	Oct. 20	Very good.
2	Clarkia	April 24	July 1	Oct. 17	Fair.
2	Coreopsis	April 15	July 12	Oct. 20	Good.
2	Cosmos	April 15	June 26	Nov. 2	Extra good.
1	Daisy	April 15			Did not germinate.
1	Eschscholtzia	June 7	Aug. 9	Oct. 11	Fair.
1	Everlasting	April 24	July 23	Oct. 20	Good.
1	Gaillardia	April 15	July 23	Oct. 20	Good.
1	Helichrysum	April 24	Aug. 10	Oct. 20	Excellent.
1	Kochia	April 15			Good.
5	Larkspur	April 24	Aug. 6	Oct. 20	Excellent.
1	Lavatera	June 7	Aug. 17	Oct. 20	Excellent.
1	Leptosiphon	April 24	June 24	Aug. 1	Very good.
1	Linum	June 7	Aug. 5	Oct. 11	Good.
2	Lobelia	April 15	July 15	Oct. 20	Good.
2	Lupinus	June 7	Aug. 5	Oct. 20	Good.
1	Malope	June 7	Aug. 27	Oct. 25	Good.
2	Marigold	April 20	July 4	Oct. 20	Very good.
2	Mignonette	April 24	Aug. 20	Oct. 20	Fair.
9	Nasturtium	May 31	Aug. 4	Nov. 2	Good.
8	Nemesia	April 17	July 9	Oct. 20	Extra good.
1	Nicotiana	April 15	Aug. 4	Oct. 20	Good.
7	Pansies	April 15	July 5	Dec. 27	Good.
1	Penstemon	April 24			Did not bloom.
3	Petunia	April 15	July 9	Nov. 1	Good.
7	Phlox Drummondii	April 15	July 11	Nov. 2	Extra good.
4	Poppy	May 31	Aug. 11	Oct. 11	Good.
1	Portulaca				Did not germinate.
1	Rudbeckia	April 24	July 16	Oct. 20	Very good.
2	Salpiglossis	April 24	Aug. 6	Oct. 20	Good.
2	Salvia	April 24	Aug. 16	Nov. 1	Good.
1	Scabiosa	April 24	July 23	Oct. 20	Fair.
1	Schizanthus	April 24	July 9	Oct. 20	Fair.
7	Stock	April 15	July 8	Dec. 7	Extra good.
1	Swan River Daisy	June 7	Aug. 8	Oct. 2	Good.
1	Sweet Alyssum	April 24	June 17	Oct. 20	Good.
2	Sweet Sultan	April 24	Aug 1	Oct. 20	Fair.
1	Tagetes	April 24	July 8	Oct. 20	Extra good.
110	Sweet Peas	April 23	July 20	Nov. 15	Extra good.
5	Verbena	April 15	July 12	Oct. 23	Good.
1	Viscaria	April 24	July 23	Oct. 2	Fair.
3	Zinnia	April 15	June 30	Oct. 7	Good.

The season for bulbs was ideal and we had the finest showing that we have yet grown at this Station. The cool weather retarded the falling of the bloom until very late in the season. Lists of the different bulbs are here given with details *re* height, colour, and blooming period.

CHARLOTTETOWN.

EARLY TULIPS.

Variety.	Height.	Colour.	Blooming Period.	
			From	To
	Inches.			
Artus	12	Bright Red	June 1	June 18
Chrysolora	13	Orange yellow	May 29	June 16
Cottage Maid	12	Rose and white	June 1	June 17
Duchesse de Parma	17	Brick and yellow	May 31	June 14
Joost van Vondel, red	14	Red	June 1	June 16
Joost van Vondel, white	15	White	May 26	June 10
Keizerskroon	16	Red and yellow	June 6	June 18
La Reine	17	White	May 29	June 16
Pottebakker, scarlet	16	Scarlet	May 31	June 18
Pottebakker, white	18	White	May 26	June 16
Proserpine	14	Pink	June 6	June 22
Vermilion Brilliant	13	Scarlet	May 29	June 17
Couronne d'or	12	Orange scarlet	June 7	June 18
Imperator rubrorum	14	Scarlet	May 29	June 18
Murillo	11	Pink and white	June 7	June 21

LATE TULIPS.

Darwin Mixture, 11 sorts	30	Varied colours	June 13	July 3
Gesneriana Spathulata	23	Scarlet	June 15	June 26
Inglescombe Yellow	20	Yellow	June 14	July 3
Isabella	19	Pink and white	June 8	July 3
La Candeur	17	White	June 14	June 26
La Merveille	24	Bronze salmon	June 14	July 3
Picotee	25	White, pink edged	June 20	June 28
The Fawn	16	Fawn	June 14	July 3
Yellow Rose	25	Golden yellow	June 14	July 3

OTHER BULBS.

Crocus—				
Crocus General mixed	5	Varied	April 21	May 15
Freesia—				
Freesia refracta alba	7	White	May 8	May 27
Narcissus—				
Albo pleno odorato	14	White	May 28	June 5
Barri Conspicuus	15	Yellow	May 21	June 19
Cynosure	16	Orange Cup	June 4	June 18
Double Van Sion	9	Yellow	May 24	June 14
Emperor	15	Yellow	May 25	June 16
Empress	14	Yellow and white	May 25	June 16
Figaro	15	Pale yellow	May 31	June 16
Golden Spur	12	Deep yellow	May 21	June 10
Incomparabilis plenus	15	Rich yellow	May 31	June 14
Orange Phoenix	15	Orange and white	May 31	June 16
Princeps	11	Yellow	May 24	June 10
Sir Watkin	16	Deep yellow	May 24	June 16
Victoria	13	Clear yellow	May 25	June 16

PERENNIALS.

The new 12-foot perennial borders were filled up with seedling stock and with mature plants removed from the east lawn near the office door. These hardy flowers are deservingly popular about the country homes as they require less attention than the annuals at the busy seasons of the year. If one were to single out any of these

CHARLOTTETOWN.

beautiful flowers for special mention, the pæonies would come first both on account of the wonderful size and number of blooms and for the deep green foliage that remains an ornament through the summer. The Kentucky water-lilies have spread over quite an area of the natural pond near the Station buildings and would make a close second to the paeonies. Both these were greatly admired by visitors.

A number of the outstanding perennials with brief notes are mentioned in the following table:—

No. of varieties.	Name.	Height.	In Bloom.		Remarks.
			From	To	
		Inches.			
8	Aquilegia (Columbine)	20 to 30	June 5	Aug. 18	Good.
19	Campanula (Bell Flower)	12 to 48	July 10	Sept. 1	Extra good.
15	Delphinium (Larkspur)	18 to 60	June 23	Sept. 7	Extra good.
2	Dianthus	6 to 10	June 18	Aug. 28	Good.
29	Gladioli	28 to 42	Aug. 16	Sept. 29	Good.
5	Hollyhock	48 to 60	Aug. 10	Sept. 7	Fair.
50	Iris	11 to 36	June 9	July 16	Medium.
4	Lupinus	23 to 41	June 20	July 15	Good.
6	Phlox	15 to 39	Aug. 24	Nov. 2	Extra good.
38	Pæony	22 to 44	June 30	Aug. 17	Extra good.
4	Sweet William	18 to 26	June 30	Sept. 1	Good.
5	Water-lilies	24 to 48	June 11	Sept. 10	Excellent.

CHARLOTTETOWN.

EXPERIMENTAL FARM, NAPPAN, N.S.

REPORT OF THE SUPERINTENDENT, W. W. BAIRD, B.S.A.

HORTICULTURE.

The unsettled nature of the winter of 1914-15 was very disappointing to horticulturists. For the greater part of the winter the ground was quite bare; this combined with the extreme fluctuations in temperature made the season more than ordinarily severe on such crops as strawberries, perennials, etc. The spring continued unsatisfactory, cold wet weather prevailing until the end of May.

June started in with fine warm days, but the nights continued cool, preventing any outside work of any consequence being done. On the night of the 3rd a reading of 2° Fahr. of frost was recorded. This was rather disastrous in that it ruined the foliage of those shrubs which had started growth, and even the large shade trees suffered severely. Following this, however, the weather became more favourable, permitting the rushing of seeding operations.

The cold wet weather of the spring was a great handicap to cultural experiments in vegetables. The location selected for these experiments was so wet that no work could be done upon it until the 15th of June. The result of the late start was noticeable throughout the whole season and it prevented any results being obtained from many of the experiments. The same applies to a new small fruit plantation started this season. The young plants had to be held over so long before being set in their permanent places that a large percentage of them never recovered.

July and August were quite seasonable months. Good growth in trees and shrubs and abundant bloom was the direct result. Notwithstanding the reorganization of the perennial border and lack of bulbs, the bloom was abundant and received high praise.

The balance of the season was quite unsettled, but by taking advantage of the favourable weather, the greater part of the large fruits and potatoes were harvested and stored in good condition. Bulbs were planted during a few fine days in November under very favourable conditions.

Speaking generally, the season was very disappointing in that the adverse conditions prevailing during the spring months placed all horticultural crops under a disadvantage from which they did not recover during the remainder of the summer.

Some Weather Observations taken at Nappan Experimental Farm, 1915.

Month.	Temperature F.			Precipitation.			Total Sunshine.
	Highest.	Lowest.	Mean.	Rainfall.	Snowfall.	Total.	
	°	°	°	Inches.	Inches.	Inches.	Hours.
January	53	−10	21·61	2·69	14·00	4·09	75·10
February	54	−14	23·64	1·01	3·00	1·31	94·70
March	48	9	26·35	.....	12·00	1·20	75·00
April	62	18	36·50	2·19	11·00	3·29	100·90
May	71	26	45·72	4·43	.....	4·43	136·15
June	81	30	56·44	3·57	.....	3·57	195·00
July	81	43	62·99	1·95	.....	1·95	215·10
August	81	34	63·04	4·67	.....	4·67	186·60
September	78	32	56·49	1·47	.....	1·47	175·70
October	68	24	48·11	4·11	.....	4·11	145·60
November	57	19	38·46	4·63	.....	4·63	47·90
December	52	6	28·59	3·96	8·00	4·76	64·40
Total for year				34·68	48·00	39·48	1,512·15
Average for 5 years				30·79	54·34	36·73	1,884·67
Total for 6 growing months, April to September				18·28	11·00	19·38	1,009·45
Average for 5 years for 6 growing months, Apr. to September				17·74	8·50	18·59	1,228·34

TREE FRUITS

Large fruits were, as a general rule, below the average in quantity. The earlier varieties produced an average yield but the fall and winter varieties were disappointing. This was, no doubt, largely due to the unfavourable weather conditions prevailing during the blossoming period. Three sprayings only were given during the season, the early or dormant spray being missed. All of these sprays were of lime sulphur and lead arsenate with the exception of some experiments in which Bordeaux mixture and arsenate of lead were used. They were made in the following strengths at the period stated:—

First spray when leaf clusters were showing green—		
Lime-sulphur	gallons.	3
Lead arsenate	pounds.	5
Water	gallons.	100
Second spray when the petals of flower blossoms had fallen—		
Lime-sulphur	gallons.	2½
Lead arsenate	pounds.	5
Water	gallons.	100
Third spray two weeks later—		
Lime-sulphur	gallons.	2½
Lead arsenate	pounds.	5
Water	gallons.	100

Fruit was remarkably clean notwithstanding the favourable condition for fungi development. Insects, excepting aphis, gave but little trouble. The aphis were quite prevalent but were easily controlled by application of Black Leaf 40, 1 pint to 100 gallons of water. This was, in our case, mixed with lime sulphur and applied during the last two sprayings.

The following experiment was again conducted this year to determine the relative efficiency of Bordeaux mixture and lime sulphur. Standard strengths were used in all cases.

SPRAY EXPERIMENTS.

Lime Sulphur *versus* Bordeau Mixture.

—	Clean.	Wormy.	Scab.	Russet.	Oyster Shell Scale.
Lime Sulphur:—	%	%	%	%	%
Beautiful Arcade	84	12	.....	.....	4
Long Arcade	81	16	.....	3	.....
Grandmother	72	20	3	5	.....
Duchess	67	29	.....	.....	4
Winter Bough	74	14	.....	7	5
Pewaukee	84	7	3	4	2
Bordeaux:—					
Beautiful Arcade	69	9	3	17	2
Long Arcade	60	14	5	21	.....
Grandmother	58	11	.....	27	4
Duchess	44	30	5	15	6
Winter Bough	53	8	.....	34	5
Pewaukee	64	13	3	20	.....

These results, considered along with those of last year, conclusively show that cleaner fruit is obtained when lime sulphur is used than when Bordeaux mixture is applied. This is applicable to this section of the province in particular.

NAPPAN.

COMMERCIAL ORCHARD.

For the purpose of obtaining the actual cost of bringing an orchard into profitable bearing complete records are being kept from year to year of the expenditure incurred by the different cultural operations also the revenue obtained from the various inter-crops. The following statement shows the financial standing of this orchard at the end of the fifth year.

1915 Date.	Work engaged in.	Manual Labour at 17 cts. per hour.	Cost.	Horse Labour and Teamster 1 horse at 27 cents; 2 horses at 34 cents; 3 horses at 41 cents; 4 horses at 48 cents.	Cost.
			$ cts.		$ cts.
1911			69 50		28 80
1912			19 50		23 90
1913			38 00		35 15
1914			150 96		35 11
Feb 23	Pruning	1 man 3 hours	51		
May 26	Spraying	2 men 1 hour	34	2 horses 1 hour at 34 cents	34
June 1	Spraying	2 men 1 hour	34	2 horses 1 hour at 34 cents	34
" 14	Spreading manure	1 man 10 hours	1 70	2 horses, 22 hours at 34 cents	7 48
" 14	Manure	30 tons at $1 p. ton	30 00		
" 16	Ploughing			2 horses 5.5 hours at 34 cents	1 87
" 16	Harrowing			2 horses 5.5 hours at 34 cents	1 87
" 16	Harrowing	1 man 11 hours	1 87		
" 17	Harrow'g, double cutaway			4 horses 5 hours at 48 cents	24
" 17	Cutting sets	1 man 10 hours	1 70		
" 19	Planting potatoes	2 men 20 hours	6 80		
" 19	Running drills			2 horses 11 hours at 34 cents	3 74
" 21	Planting potatoes	2 men 3 hours	1 02		
" 21	Running drills			2 horses 2 hours at 34 cents	68
" 21	1 pound bichloride for treating potatoes		1 80		
" 29	Harrowing down drills			2 horses 1 hour at 34 cents	34
July 15	Spraying potatoes			2 horses 1 hour at 34 cents	34
" 15	Spraying potatoes	2 men 1 hour	34		
" 16	Hoeing potatoes	2 men 40 hours	13 60		
" 16-28	Cultivating (4 times 2½ hours each)			1 horse 10 hours at 27 cents	2 70
" 20	Weeding	1 man 16 hours	2 72		
" 22	Weeding	2 men 10 hours	3 40		
" 26	Mowing cover crops	1 man 10 hours	1 70		
" 29	Spraying potatoes	2 men 10 hours	3 40	2 horses 10 hours at 34 cents	3 40
" 29	Picking berries at 1·5c per box		13 47		
Oct. 1	Digging and picking potatoes	6 men 10 hours	10 50	1 horse 5 hours at 27 cents	1 35
	3,000 strawberry plants at $6.00		18 00		
	15 bushels seed potatoes		15 00		
		Total	406 17		147 65

Revenue.—Revenue from former years, $196.16; from the rate of potatoes, grain and strawberries for 1915, $304.46; total revenue $500.62, leaving only a small deficit against the orchard of $53.20 at the end of five years.

It is of interest to know that some of the earlier maturing varieties such as Duchess and Wealthy bore some fruit during the last season, which means that a slight revenue will soon be realized from the trees.

PEARS, PLUMS AND CHERRIES.

This orchard is now of no further use for experimental purposes. A general summary of the results obtained was published in last year's report.

SMALL FRUITS.

STRAWBERRIES.

As mentioned under seasonal notes the weather during the winter was particularly severe on strawberries, many of our best varieties being entirely killed out. This crop was grown in the commercial orchard and, apart from the winter killed plots, gave an average yield. Below are the varieties tested and yields obtained from plots of 1/528 of an acre with estimated yields per acre.

Name.	Yield per plot.	Yield per acre.
	Quarts.	Quarts.
1. Seedling No. 12	27	14,256
2. Pearl	27	14,256
3. Equinox	22	11,616
4. John Little	21	11,088
5. H. W. Beecher	19	10,032
6. Gandy	18	9,504
7. Princess	17	8,976
8. Beverly	16	8,448
9. Jas. Vick	16	8,448
10. Haverland	16	8,448
11. Senator Dunlap	16	8,448
12. Williams	16	8,448
13. Capt. Jack	16	8,448
14. Maggie	14	7,392
15. Paris King	14	7,392
16. Crescent	14	7,392
17. St. Antoine de Padoue	14	7,392
18. Hood River	14	7,392
19. Afton	14	7,392
20. Pocomoke	13	6,864

A new plantation of raspberries, dewberries, currants and gooseberries was established in June. As stated before, however, the lateness of the season and the unworkable nature of the soil prevented the planting of these bushes until late and consequently many of them died. These will be replaced. The following varieties will be selected for testing:—

Raspberries.—Ruby Red, Heebner, Eaton, King, Brighton, Herbert, Loudon, Count, Sarah.

Black Currants.—Climax, Victoria, Collins prolific, Buddenborg, Kerry, Clipper, Eagle, Eclipse, Saunders, Magnus, Boskoop Giant.

Red Currants.—Cherry, Pomona, Cumberland Red, Victoria, Red Grape, Red Dutch, Rankins Red, Greenfield, Wilder.

White Currants.—White Grape, Large White, White Cherry.

Gooseberries.—Oregon Champion, Houghton, Carrie, Josselyn, Pearl.

NEW PLANTATION MADE.

Two new plantations of rhubarb and asparagus were also started in the same place of the following varieties:—

Rhubarb.—Hobday Giant, Victoria, Linnaeus.

Asparagus.—Columbian Mammoth, Conover Colossal.

NAPPAN.

VEGETABLES.

Variety tests of the various vegetables were made as in previous years, but the lateness of the season and unfavourable nature of the ground spoiled these experiments to a large extent. The following were the varieties tested and the yields obtained.

SQUASH.

Five varieties were planted in hills on the 17th of June. The hills were sufficient distances apart to prevent the intermingling of the vines. The yields were as follows:—

No.	Name.	Fit for use.	No. of squash.	Average.	Total weight.
				lb.	lb.
342	Golden Hubbard	Nov. 17	8	9	72
343	Hubbard	" 17	8	8·5	68
341	Long Vegetable Marrow	" 29	8	4	32
345	Delicious	" 17	8	4	32
340	Delicata	" 30	8	2¼	18
344	Crookneck	" 17	8	1⅛	9⅛

CABBAGE.

Twelve varieties of cabbage were sown in hotbeds on the 13th of April and were transplanted to the open on June 16 in rows 33⅓ feet long and 36 inches apart, the plants being 18 inches apart in the rows. Twenty average heads of each variety were weighed and recorded as follows:—

No.	Name.	Quality.	Date of Harvesting.	No. of Head.	Average weight per head.	Total weight.
					lb.	lb.
265	Flat Swedish	Good	October 24	20	7·5	150
264	Danish Summer Ballhead	Good	" 24	20	4·5	90
266	Extra Amager Danish Roundhead	Medium	" 24	20	3·75	75
267	Improved Amager Danish Roundhead	Medium	" 24	20	3·65	73
370	Extra Amager Danish Ballhead	Poor	" 24	20	2·8	56
268	Fottlers Improved Brunswick	Good	" 24	20	3·15	63
262	Paris Market, Very Early	Good	" 24	20	2·8	56
261	Early Jersey Wakefield	Good	" 24	20	2·35	47
260	Nofalt	Poor	" 24	20	2	40
347	Danish Stonehead (Red)	Good	" 24	25	3	75
346	Danish Delicatesse (Red)	Medium	" 24	25	2·4	60
263	Copenhagen Market	Good	" 24	20	1·75	35

CAULIFLOWER.

Three different varieties of cauliflower were sown in hotbeds on the 16th of April and transplanted to the open on June 16 in rows 33½ feet long and 36 inches apart, the plants being 14 inches apart in the rows. The results were as follows:—

No.	Name.	Fit for use.	Quality.	No. of Head.	Yields.	
					Average.	Total.
					lb.	lb.
269	Early Snowball	Sept. 1	Good	24	1·54	37
270	Extra Selected Early Dwarf Erfurt	" 3	Good	24	1·7	40·8
271	Danish Giant Dryweather	" 1	Medium	24	1·71	41·1

TOMATOES.

Nine varieties of tomatoes were sown in hotbeds on the 15th of April. They were transplanted to the open on June 17 in rows 33⅓ feet long, the plants being 4 x 4 feet apart. The following table gives the results:—

No.	Name.	Fit for use	Quality.	Yields.		
				Ripe.	Green.	Total.
				lb.	lb.	lb.
359	Bonny Best	Sept. 10	Fair	2½	20	22½
357	Rennie XXX Early Round Scarlet Skin	Sept. 15	"	3	16	19
362	Sunnybrook Strain Earliana		"	.....	19	19
363	AAlacrity 12B		"	.....	18	18
358	Line Bred Northern Adirondack Grade No. 1	Sept. 18	"	½	15½	16
360	Johnson Jack Rose		"	.....	14	14
356	Bolgiano Extra Early Wealthy	Sept. 20	"	1½	12	13½
361	Chalks Early Jewel		"	.....	8	8
363	BAlacrity 14B		"	.....	6	6

ONIONS.

Five varieties of onions were sown in hotbeds on the 23rd of March. These were transplanted to the open on June 16 in rows 33⅓ feet long. The results obtained were as follows:—

No.	Name.	Fit for use.	Colour.	Quality.	Weight.
					lb.
318	Large Red Wethersfield	Oct. 11	Red	Fair	28
314	Red Globe	Oct. 11	Red	Fair	25
317	Danvers Yellow Globe	Oct. 11	Yellow	Fair	23
316	Yellow Globe	Oct. 11	Yellow	Fair	19½
315	White Globe	Oct. 11	White	Fair	17

PEAS.

Twelve varieties of peas were sown on June 16 in single rows 33⅓ feet long and 30 inches apart. The following results were obtained:—

No.	Name.	Fit for use.	Quality.	Height.	Dates and Yields.				Total of green peas in pod.
					Aug. 13.	Aug. 18.	Aug. 23.	Aug. 29.	
				Inches.	lb.	lb.	lb.	lb.	
336	Telephone	Aug. 15	Good	40	.....	7	6½	4	17½
331	Gregory Surprise	Aug. 8	Good	40	11	4	1½	.....	16½
337	Thos. Laxton	Aug. 13	Good	40	.....	6	6	4	16
335	Sratagem	Aug. 23	Good	20	.....	.....	7	8	15
328	Sutton Excelsior	Aug. 15	Good	27	.....	9	.....	5	14
327	Gradus	Aug. 13	Good	50	3	5	4	.....	12
330	Advancer	Aug. 12	Good	20	4	5	3	.....	12
332	Early Giant	Aug. 6	Medium	50	8	2	.....	.....	10
326	Dainty Duchess	Aug. 16	Medium	45	.....	2½	3	4	9½
333	The Lincoln	Aug. 16	Medium	25	.....	3	4	2	9
334	Juno	Aug. 23	Good	20	.....	5	.....	2½	7½
329	Quite Content	Aug. 16	Medium	50	.....	2	3	1½	6½

BEANS.

Ten varieties of beans were sown on the 16th of June in rows 33⅓ feet long and 3 feet apart. The following results were obtained:—

No.	Name.	Fit for use.	Colour.	Quality	Length of pod.	Dates and Yields.			Total weight.
						Aug. 24.	Sept. 3.	Sept. 9.	
					Inches.	lb.	lb.	lb.	lb.
246	Refugee or 1000 to 1	Aug. 20	Green	Fair	4½–5	10	4	3	17
249	Valentine Wax	Aug. 24	Yellow	Fair	4½	7	5	3	15
251	Extra Early Valentine	Aug. 21	Green	Fair	5	6	5	2	13
243	New White Seeded Stringless Green Pod	Aug. 24	Green	Fair	5½–6	4	8	0	12
245	Grennell Rustless Wax	Aug. 30	Yellow	Fair	4½	0	6	5	11
250	Wardwell Kidney Wax	Aug. 30	Yellow	Fair	4½–5	0	4	7	11
248	Stringless Green Pod	Aug. 24	Green	Fair	5½	5	3	0	8
252	Extra Early Refugee	Aug. 22	Green	Fair	4½	4	4	0	8
244	Bountiful Green Bush	Aug. 20	Green	Fair	6–6½	2	0	5	7
247	Golden Wax	Aug. 30	Yellow	Fair	5	0	3	3	6

BEETS.

Six varieties of beets were sown on the 16th of June in rows 33⅓ feet long and 30 inches apart. The beets were thinned to 2 inches apart. The following results were obtained:—

No.	Name.	Fit for use.	Shape.	Quality.	Weight when pulled.
					lb.
257	New Early Black Red Ball	Aug. 15	Round	Good	27
256	New Meteor	Aug. 18	Turnip	Good	23
253	Ruby Dulcet	Aug. 12	Round	Good	22
255	Eclipse	Aug. 15	Pointed	Good	20
254	Cardinal Globe	Aug. 15	.....	Good	19
258	Crosby Egyptian	Aug. 17	Turnip	Medium	15

LETTUCE.

Five varieties of lettuce were grown in single rows 33⅓ feet long and 30 inches apart. The plants were thinned to 12 inches apart. The following results were obtained:

No.	Name.	Fit for use.	Quality.	Yield
				lb.
305	Grand Rapids Forcing	Aug. 28	Good	19
304	Giant Crystal Head	Sept. 3	Medium	8
307	Iceberg	Sept. 15	Poor	7
308	Dreer All Heart	Sept. 17	Good	6
306	Black Seeded Simpson	Sept. 25	Good	5½

CARROTS.

Four varieties of carrots were sown on June 16 in rows 33⅓ feet long and thinned to 1½ inches. The following results were obtained:—

No.	Name.	Harvested.	Shape.	Quality.	Weight when pulled
					lb.
275	Early Scarlet Horn	October 1	Long	Good	60
274	Half Long Chantenay	" 1	Half long	Good	51
272	Improved Danvers Half Long	" 1	Half Long	Medium	41
273	Improved Nantes	" 1	Half Long	Medium	30

CUCUMBERS.

Five varieties of cucumbers were planted on June 17 in hills. The hills were a sufficient distance apart to prevent the intermingling of the vines. Yields were obtained from all but White Spine (298). The following are the results obtained:—

No.	Name.	No. of Hills.	Quality.	Yields.
				lb.
297	Extra Early Russian	2	Good	8
296	Prize Pickle	2	Medium	5
299	Davis Perfect	2	Good	5
300	Fordhook Famous	2	Good	3

TURNIPS.

Eight varieties of turnips were sown for table use on June 16, in rows 33⅓ feet long and 30 inches apart. They were thinned to 12 inches apart. The yields were as follows:—

No.	Name.	Date harvested.	Yield. lb.
353	Carter Invicta	October 15	107
354	Sutton Purple Top	" 15	100
348	Best of All	" 15	98
352	Favorite	" 15	95½
350	Bangholm Purple Top	" 15	91
349	Westbury Purple Top	" 15	73
351	Hall Purple Top	" 15	52
355	Skirving Purple Top	" 15	51

The results obtained from artichokes, Brussels sprouts, celery, corn, peppers, radish, spinach and muskmelons were so poor that they were considered not worth recording. Lateness of season and poor state of land were the main causes.

CULTURAL EXPERIMENTS WITH VEGETABLES.

A large number of cultural experiments with vegetables were started this year, but here again many were spoiled by the season. Those from which results were obtained, and the necessary details of each, are enumerated below:—

Tomatoes.—Five experiments with tomatoes using the varieties Sunnybrook Earliana and Bonny Best, 25 plants of each variety, were conducted with the following results:—

1. Plants allowed to grow unpruned and left lying on the ground. Twenty-five plants of each variety were used and these were planted 4 feet apart each way.

(*a*) Sunnybrook Earliana	2½	lb. ripe.
	100½	lb. green.
	103	lb. total.
(*b*) Bonny Best	62	lb. ripe.
	41	lb. green.
	103	lb. total.

2. Plants were pruned to one stem and planted in rows 4 feet apart and plants 2 feet apart.

(*a*) Plants tied to stakes 5 feet long and at least 1½ inches in diameter; side shoots pinched out as they appeared. 25 plants of each variety.

Sunnybrook Earliana	63¾	lb. green.
Bonny Best	64½	lb. green.

(*b*) Plants tied to three stout wires, the first 15 inches from the ground, the second 18 inches above the first, and the third 18 inches above the second; 25 plants of each variety.

Sunnybrook Earliana	21	lb. green.
Bonny Best	31¼	lb. green.

(*c*) Plants tied to stakes and half foliage removed; 25 plants of each variety.

Sunnybrook Earliana	1¾	lb. ripe.
	16	lb. green.
	17¾	lb. total.
Bonny Best	1½	lb. ripe.
	15	lb. green.
	16½	lb. total.

(*d*) Plants tied to stakes and no foliage removed; 25 plants of each variety. (Same result as "*a*.")

3. Plants pruned to 2 stems and tied to stakes and wires; 25 plants of each variety.

(*a*) Tied to stakes 5 feet long—

Sunnybrook Earliana	11	lb. ripe.
	101	lb. green.
	112	lb. total.
Bonny Best	56	lb. green.

(*b*) Tied to wires 4½ feet high—

Sunnybrook Earliana	10	lb. ripe.
	63	lb. green.
	73	lb. total.
Bonny Best	3	lb. ripe.
	94	lb. green.
	97	lb. total.

(*c*) Tied to stakes and half foliage removed—

Sunnybrook Earliana	1	lb. ripe.
	14	lb. green.
	15	lb. total.
Bonny Best	29	lb. green.

(*d*) Tied to stakes and no foliage removed. (Same result as "*a*.")

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4. An experiment conducted to ascertain the more suitable method of starting plants, whether in pots or flats. The same two varieties were used and 25 plants of each set. Following is the weight of green fruit.

	Pots.	Flats.
Sunnybrook Earliana	34 lb.	60 lb.
Bonny Best	14 lb.	43½ lb.

5. Different methods of ripening fruit.

(*a*) Placed in the sun—

Ripe	100 per cent.
Green	... "

(*b*) Put in shade in a moderately warm place—

Ripe	79 per cent.
Green	21 "

(*c*) Put in closed box without ventilation—

Ripe	98 per cent.
Green	2 "

(*d*) Hanging plants up in a moderately warm building.

Ripe	92 per cent.
Green	8 "

CAULIFLOWER.

The following experiments to determine the most efficient method of controlling the root maggot in cauliflower were conducted. Twenty-two plants each of Early Dwarf Erfurt and Snowball varieties were used and were planted 18 inches apart in rows 30 inches apart.

1. Plants entirely unprotected—

Early Dwarf Erfurt	no yield.
Snowball	27¾ lb.

2. Plants protected with tar felt paper discs—

Early Dwarf Erfurt	11¼ lb.
Snowball	20 lb.

3. Plants protected by a covering of cheese cloth—

Early Dwarf Erfurt	11¾ lb.
Snowball	16½ lb.

CABBAGE.

The same experiments were conducted with cabbage as with cauliflower, Early Jersey Wakefield and Copenhagen Market being the varieties used. The following results were obtained:—

1. Plants unprotected—

Early Jersey Wakefield	6½ lb.
Copenhagen Market	18 lb.

2. Tar felt paper discs used—

Early Jersey Wakefield	41 lb.
Copenhagen Market	33 lb.

3. Cheese cloth protection used—

Early Jersey Wakefield	77½ lb.
Copenhagen Market	33 lb.

NAPPAN.

CARROTS.

Thinning experiments with the Chantenay variety of carrots were conducted to determine if possible the proper distance at which to grow them. To this end they were planted in rows 30 inches apart and were thinned to 1½, 2, and 3 inches. One hundred feet of row was taken and the following yields obtained:—

Thinned to 1½ inches	31 lb.
" 2 "	42 lb.
" 3 "	47 lb.

BEETS.

A similar experiment with beets was conducted, the variety Early Model being used, and the plants thinned to 2, 3, and 4 inches apart. With a 100-foot row the yields were:—

Thinned to 2 inches	31 lb.
" 3 "	32 lb.
" 4 "	20 lb.

PARSNIPS.

An exactly similar experiment with parsnips, Hollow Crown variety, resulted in:

Thinned to 2 inches	25 lb.
" 3 "	30 lb.
" 4 "	40 lb.

In all of the vegetable cultural experiments the effects of the season and other reasons prevent the drawing of any definite conclusions. The experiments will be continued for the next few years after which some reliable and valuable conclusions should be drawn.

POTATOES.

Experiments were conducted with seventeen varieties of potatoes in duplicate plots. These were located in the commercial orchard. The land was a medium clay loam, which received an application of barnyard manure at the rate of 20 tons per acre. Sets were planted 12 inches apart in rows 30 inches apart. Each plot occupied 1/100 of an acre. The potatoes were planted on June 19 and harvested on September 29. During the season they received four cultivations and two hoeings.

The following results were obtained:—

POTATOES.—Test of Varieties.

	Variety.	1st plot yield per acre.		2nd plot yield per acre.		Average yield per acre.	
		Bush.	lb.	Bush.	lb.	Bush.	lb.
1	Wee McGregor	321	40	341	40	331	40
2	Carman No. 1	270		306	40	228	20
3	Irish Cobbler	295		328	20	311	40
4	Rawlings Kidney	298	20	278	20	283	20
5	King Edward	235		296	40	265	50
6	Morgan Seedling	266	40	266	40	266	40
7	Late Puritan	313	20	258	20	285	50
8	Empire State	298	20	241	40	270	
9	Early Rose	228	20	291	40	260	
10	Rochester Rose	255		283	20	269	10
11	Dalmeny Beauty	150		188	20	169	10
12	Everett	311	40	328	20	320	
13	Reeves Rose	258	20	305		281	40
14	Vick Extra Early	308	20	316	40	312	20
15	Green Mountain	320					
16	Bugless and Blightless	261	40				
17	Gold Coin	278	20	258	20	268	20

FIELD LOTS OF POTATOES.

In order to supply at a reasonable rate a limited amount of good seed potatoes to farmers wishing to obtain same it was decided to grow a half acre each of Irish Cobbler and Green Mountain. The following is the amount of each available for seed purposes:—

Date of planting.	Area.	Variety.	Amount.	
			Bush.	lb.
June 19	½ acre.	Irish Cobbler.	158	45
June 19	½ acre.	Green Mountain	139	21
		Total	298	7

ELITE STOCK.

The work of improving the strain of six varieties of potatoes by field selection was continued during the season. The varieties were the same as for the previous year, namely, Irish Cobbler, Carman No. 1, Wee McGregor, Empire State, Rawlings Kidney and Green Mountain.

The method of selection was to have all hills dug separately and then twenty-five of the best hills collected and weighed. All hills chosen had a high percentage of marketable potatoes of proper size. For comparison the average for all hills was taken and the following results were obtained:—

No.	Name of variety.	Selected Hills.	Average for all hills.
		lb.	lb.
1	Irish Cobbler	34·5	28·8
2	Wee McGregor	36·0	21·0
3	Carman No. 1	34·0	16·6
4	Empire State	36·0	21·0
5	Rawlings Kidney	37·0	24·7
6	Green Mountain	41·0	19·4

This selection will be continued by the same method next year.

FLOWERS.

A change in our perennial border was effected this season. The old border had been established a number of years and had practically outgrown its usefulness. The more desirable varieties were transferred to the new border which was laid off in a semi-circle, and many new species obtained from Ottawa were planted. Notwithstanding the lateness of the season at which the transfer was made, all plants made excellent growth and considerable bloom was shown.

The annuals and such bulbs as dahlias, gladioli, etc., were judiciously intermingled with the perennials, and a most attractive display resulted. Much better results are expected this coming season, however.

In the centre of the border, and leading to the large lawn beyond, an arch is being erected which will be covered with climbing roses. At either end flowering and evergreen shrubs are being planted, and the whole effect should be most pleasing.

A variety test of sweet peas was made this season, about 108 varieties being planted. The lateness of the season prevented these being planted sufficiently early to obtain good results. Consequently no definite conclusions can be drawn.

Several new lawns were prepared and seeded during the summer and fall, including a grass tennis court on the site of an old shed. This ground was graded, levelled and rolled and a good catch of lawn seed obtained. The following mixture was used, 28 pounds Kentucky blue and 45 pounds of timothy to the acre.

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ORNAMENTAL TREES AND SHRUBS.

Considerable thinning out of our ornamental and flowering shrubs was made this year which resulted in a stronger vegetative growth and more abundant bloom. Many of these have been out a number of years and are now approaching maturity. A few new shrubs and a large number of roses were planted. The following were the varieties obtained and all apparently went into the winter in good shape:—

ROSES.

3 Hansa.
2 Blanc double de Coubert.
3 Persian Yellow.
3 Wm. Lobb.
3 Blanche Moreau.
6 Hugh Dickson.
6 Margaret Dickson.
5 Baron Rothschild.
3 Abel Carriere.
3 Mme. Chas. Wood.
3 Geo. Arends.
3 Mme. Caroline Testout.
5 Dorothy Perkins.
3 Mme. Geo. Bruant.
3 Conrad F. Myers.
3 Harrison Yellow.
3 Salet.
6 Mrs. John Laing.
3 General Jacqueminot.
5 Frau Karl Druschki.
2 Alfred Colomb.
3 Magna Charta.
3 John Hooper.
6 J. B. Clark.
7 Crimson Rambler.
2 American Pillar.

SHRUBS.

30 *Spiraea Van Houttei.*
30 *Spiraea arguta.*
30 Lilacs, assorted,
10-*alba grandiflora.*
10-*Condorcet.*
10-*Geo. Bellair.*
3 Weigela, Eva Rathke.
30 Mock Orange, assorted,
15-*Grandiflorus.*
15-*Boquet Blanc.*
6 *Crataegus Crus-galli.*

The hedges made their usual strong growth necessitating constant attention. The common spiræa hedge was removed as it was getting so large it was seriously interfering with those alongside of it.

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EXPERIMENTAL STATION, KENTVILLE, N.S.

REPORT OF THE SUPERINTENDENT, W. SAXBY BLAIR.

This is the fourth annual report of the horticultural work carried on at this Station and covers such experiments as it is thought are sufficiently advanced to be of value. Some additional fruit trees were planted during the past season and the orchard that it is proposed to plant has been practically completed. A list of the orchard fruits is given in this report. Trials were continued this season with vegetables of different kinds, a report of some of which is given herewith. The annual and perennial flowering plants and bulbs made their usual attractive show. The experimental orchard work was continued at Berwick, Kings county; Falmouth, Hants county; and Bridgetown, Annapolis county, a report of which is given.

The fruit crop on the average was not of high quality. The season was particularly favourable for apple scab and the weather was unsuitable for effective spraying resulting in much of the fruit going into the number three pack. The crop, where persistent and thorough spraying was done, packed out well. The apple crop was about two-thirds an average yield. Owing to the high freight rates the exported fruit did not net the growers as much as that disposed of locally.

The past winter has been a severe one on peach trees, and they have killed back considerably. Shrubs not very hardy have also killed back some. Strawberries came through the winter in excellent condition.

THE WEATHER.

Owing to a low uniform temperature throughout the latter part of April and the first week in May the fruit trees remained practically dormant. The mean average temperature for the last half of April, first and last halves of May and first half of June were 39·4, 43·76, 48·37 and 56·7 degrees Fahr., respectively, as compared with 41·2, 43·04, 57·5 and 54·26 degrees for 1914, and with 47·93, 44·73, 47·97 and 58·3 degrees for 1913.

Slight frosts occurred on May 7, 11, 14, 15, and 17, when the temperatures recorded were 30, 32, 32, 28 and 28 degrees Fahr., respectively. No frosts were recorded here during the latter part of May and early June when the fruit was in the blossoming stage. Slight frosts were reported from Berwick and Falmouth on June 3, but these were so slight that no damage resulted.

During the second week in May the fruit trees began to put forth their leaves and spraying commenced on May 14. From this date to the end of the month more or less sunshine was recorded each day except on the 16th, 18th, 22nd, and 28th. Rain fell, however, during the day on the 15th, 18th, 19th, 23rd, 27th and 29th, and during the night on the 16th, 19th, 22nd, 24th and 27th. The total precipitation during this period was not great, amounting to only 0·85 inch, of which 0·42 inch fell on the nights of the 19th and 27th. This unsettled weather during the early spraying operations hampered the work very much and much less spraying was done at this time than there would have been had the weather been more favourable. Cherries, plums and strawberries were in full bloom during the last days of May.

The first week in June was bright and free from rain, making conditions ideal for the trees to put forth their blossoms. Gravensteins were in full bloom on June 3, and the winter varieties on June 8. This fair weather of early June was followed by an

unusually wet period from June 7 to 25, only five out of these eighteen days being without rain, during which 2·36 inches of rain fell. The weather was dark on the 7th, 8th, 9th and 12th, with fairly bright weather on the 10th and 11th. Rain, however, fell every day and amounted to 1·01 inches of which 0·57 fell on the 9th, and 0·37 on the 12th. After the heavy rain on the 9th, very few blossoms remained on the trees. The petals fell quickly and fruit did not set as well as expected. The varieties Spy, Blenheim, Baldwin and Roxbury Russet (Nonpareil), showing a very poor set. The poor set was probably due to imperfect pollination.

This unfavourable weather for spraying, together with the urgent need of time to finish up the seeding and planting which also had been held up by the backward season, the abundance of fruit bloom, coupled with a general pessimistic feeling among the farmers (resulting from the poor prices received for the fruit the preceding season) that the crop would be a bumper one, that barrels would be high owing to the small stock of stave material got out the preceding winter, that prices would be poor owing to the war conditions, hence, a worthless crop, caused many farmers to neglect their spraying, which resulted in a bad apple scab infection and consequently a low grade of fruit. Farmers that were more optimistic and did their spraying thoroughly were rewarded for their diligence and expense by getting exceptionally good prices for their output, due partly to the small apple crop and partly to their high class of fruit in comparison to the low class that resulted from unsprayed orchards. Orchards that received four thorough applications of spray at the proper time were, in spite of the unfavourable weather, free from scab.

The rainfall for June, July and August was 7·79 inches as compared with 8·32 inches in 1914 and 6·65 inches in 1913. The precipitation this year was well distributed, and no crops suffered from drought.

The month of September was unusually bright, giving a fruit of high colour. Gravensteins were picked on September 15. The month was free from frost except for two degrees on the 26th. This gave corn and other tender vegetable crops an excellent chance to mature. A strong westerly gale on the 26th and 27th did considerable damage to the winter varieties.

As most of the precipitation occurred during the night and the sun shone on all but six days, October was an ideal month for gathering the fruit and vegetable crops. The fruit crop proved lighter than expected and the month closed with practically all the crops harvested.

November was mild and open until the last, giving the farmers ample time to do their fall ploughing. Frost prevented ploughing on the morning of the 18th, 19th and 24th of the month only, which is very unusual. December opened with a snowfall of 5 inches which quickly went off, and little snow fell again until the 31st, when a fall of 6 inches made excellent sleighing. The month was unusually mild, the mean average temperature being 29·14 degrees as compared with 22·89 for the same period in 1914, and 23·44 for 1913. There was little frost in the ground at the close of the month.

A thaw on the 5th of January took off the snow and the ground was bare during the greater part of the month. Light flurries of snow gave sleighing during the 19th, 20th and 21st, but this went off with a thaw on the 22nd. The lowest temperature was ·4 degrees below on the 18th.

After the early part of February the month was cold throughout. The lowest temperature was on the 14th, 15th, 16th, 20th, 21st and 22nd, when 1, 19, 8, 1, 4 and 7 degrees Fahr. below zero, respectively, were recorded. Frequent falls of snow throughout the month made fairly good sleighing. There was one heavy thaw during the month which was on the 26th and 27th when 1·14 inches of rain fell, causing a considerable freshet.

March has been unusually stormy and the snowfall was heavy, aggregating 40·5 inches. Twelve inches of snow on the 4th drifted badly and delayed train traffic. On

the 15th and 16th, 12·25 inches fell. At the time this caused little trouble, but, as the weather remained cold, this, with 9 inches of snow on the 23rd accompanied by heavy winds, blocked roads and tied up train traffic for several days. This was followed by mild weather on the 26th, which continued to the end of the month, resulting in a gradual disappearance of the snow without a freshet. The only rain was on the 26th of 0·01 inch. The coldest period was 2 degrees below zero on the 19th.

METEOROLOGICAL RECORDS.

Months.	Temperature F.					Precipitation.					Bright Sunshine.
	Maximum.		Minimum.		Mean.	Rainfall.		Snowfall.		Total.	
1915	Date	Deg.	Date	Deg.	Deg.	Days.	Ins.	Days.	Ins.	Ins.	Hours.
April	4–20	64	9	21	39·36	13	1·15	2	5·5	1·70	107·4
May	10	71	17–19	28	46·14	16	2·24	1	2·6	2·50	160·9
June	8	81	3	33	56·8	14	2·43	.....	.....	2·43	180·2
July	11	82	7–11	46	64·0	9	1·52	.....	.....	1·52	215·7
August	12–25	81	29	42	63·8	13	3·84	.....	.....	3·84	168·3
September	9–17	83	26	30	57·25	11	·85	.....	.....	·85	194·0
October	13–14	72	16	28	49·05	14	3·88	.....	.....	3·88	171·1
November	2	61	24	22	39·15	18	2·81	.....	.....	2·81	65·5
December	26	54	31	6	29·14	11	2·34	6	15·3	3·87	56·4
1916.											
January	22	51	18	−4	23·25	7	·65	11	11·5	1·8	93·4
February	26	49	15	−19	18·77	7	1·51	13	26·5	4·16	60·3
March	30	55	19	−2	22·09	1	·01	11	40·5	4·06	120·4
Total annual	.....	.....	.....	.....	.....	.....	23·23	.....	101·9	33·42	1,593·6

APPLES.

The apple trees planted 40 by 40 feet apart comprise twenty trees each of Banks (Red Gravenstein), Ben Davis, Yellow Bellflower (Bishop Pippin), Crimson Beauty, Cox Orange, Duchess, Fallawater, Fameuse, Gano, Golden Russet, Hubbardston, Milwaukee, Roxbury Russet (Nonpareil), Ontario, Tolman, Wellington, Yellow Transparent, Baxter, Dudley (North Star), Red Astrachan, Wolf River, and Rome Beauty; also sixty-two Baldwin, forty Blenheim, forty Rhode Island Greening, forty Ribston, fifty-four Stark, forty Northern Spy, forty Tompkins King, 176 McIntosh Red and 133 Wealthy. Seventy-four trees Walbridge have also been planted for top grafting work.

In addition to this there are 163 varieties of apples planted using two trees of a variety. In a dwarf plantation thirty-six apples are on Douciu stock, thirty-six on Paradise, twenty-five on English Paradise, and ten on French Paradise stock. A special fertilizer block includes four varieties of thirty trees each. This makes a total of 219 varieties of standards composed of 2,509 trees and eight varieties of dwarf apples of 107 trees. This makes 227 varieties and a total of 2,616 trees planted.

PLUMS.

The plums planted so far number 92 varieties. Two trees of a kind have been set of most varieties, but in addition to these, larger blocks of Monarch, Giant Prune, Reine Claude, Diamond, Burbank, and Red June have been set. The total plum trees planted number 367 trees.

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CHERRIES.

The cherry plantation includes fifty-four varieties and two trees have been planted of a kind except Black Tartarian, Windsor and Montmorency, of which larger blocks have been set, making a total of 154 cherry trees.

PEACHES.

The peach plantation includes forty-seven varieties made up principally of two trees of a kind. The total peach trees number 106.

PEARS.

The pear plantation is composed of fifty-five varieties of two trees of a kind. In addition larger plantations have been made of Bartlett, Doyenne du Comice, Clapp Favourite and Beurre Clairgeau including 113 trees. This makes a total of 223 pear trees planted.

APRICOTS AND QUINCES.

Five varieties of apricots are growing and seven varieties of quinces, making a total of twenty-three trees. The quince rust was noticed this season on some of the quince trees.

TOTAL ORCHARD FRUITS PLANTED.

	Varieties.	Number of Trees.
Apples	227	2,616
Plums	92	367
Cherries	54	154
Peaches	47	106
Pears	55	223
Apricots and Quince	12	23
Total	487	3,489

The total area in orchard fruits is 46·7 acres.

FILBERT NUTS.

Of the twenty-four varieties of filbert nut trees planted, eighteen are growing. Many of the plants have failed to make much growth, and of the 240 plants set only eighty-eight are now growing. The plants set were two-year layered stock and the loss is not due to lack of hardiness but rather to low vitality in the stock due to the long shipment from France. Older and better rooted stock should be used.

LETTUCE.

Ten varieties of lettuce were started under glass, and the same varieties were started in the field in the spring of 1914. The plants from seeds started under glass were pricked out into flats 2 inches apart. These plants were later set in the field by cutting out a square of soil with each plant. The early seeded plants were well hardened off by placing them in a cold frame for a week before setting out and suffered little check from the transplanting. This practice enables one to secure lettuce a month earlier than if the seed is started in the open ground. The same practice was

followed in 1915 except that the plants were started later, and a duplicate set of plots was seeded in the open ground. The outside seeded plants made fair growth and were ready for market about one month later than plants started under glass; they were, however, very uneven from not having been thinned to a proper distance apart, and records of the weight of heads were not secured. It is very important that the plants be thinned early to 6 inches apart in the row if good marketable heads are to be secured.

Lettuce plants started under glass if well hardened off can be set in the open ground as early as the ground can be prepared. The seed should be sown 5 weeks before planting out to secure well-developed plants. Lettuce seed should be sown in the field as early as the ground can be worked and the earlier the seeding the earlier will marketable heads be obtained.

The two varieties Red edged Victoria and Rousseau Blond were not satisfactory and went to seed early. The All Heart variety is very compact and does not go to seed as quickly as some of the other varieties. Hanson Improved is also a fine variety of good quality. The Iceberg and Giant Crystal Head form a large head but are not as compact as the other. These are all cabbage head varieties and are considered desirable in the order named. The Grand Rapids is the best open head variety.

The following table gives the time of planting, when fit for market, and the average weight per head:—

Variety.	Date of sowing.	Date of pricking out.	When planted to field.	When fit for Market and average weight per head.		
	1914.				lb.	oz.
Grand Rapids	Mar. 28	April 14	May 9	July 2	1	3
Grand Rapids	May 14			Aug. 4	..	15
Hanson Improved	Mar. 28	April 14	May 9	July 2	1	2
Hanson Improved	May 14			Aug. 5	..	13
Simpson, Black Seeded	Mar. 28	April 14	May 9	June 27	..	15
Simpson, Black Seeded	May 14			Aug. 5	1	..
Iceberg	Mar. 28	April 14	May 9	June 27	1	..
Iceberg	May 14			Aug. 5	..	15
All Heart	Mar. 28	April 14	May 9	June 27	..	15
All Heart	May 14			July 28	..	13
Giant Crystal Head	Mar. 28	April 14	May 9	July 2	1	5
Giant Crystal Head	May 14			Aug. 5	1	6
Dark Green Capucine	Mar. 28	April 14	May 9	July 18	1	4
Dark Green Capucine	May 14			Aug. 5	1	2
Unrivalled	Mar. 28	April 14	May 9	July 2	..	14
Unrivalled	May 14			Aug. 5	..	11
Red Edged Victoria	Mar. 28	April 14	May 9	July 2	..	13
Red Edged Victoria	May 14					
Rousseau Blond	Mar. 28	April 14	May 9	July 2	..	10
	1915.					
Grand Rapids	Apr. 5	Apr. 17	May 10	June 29	10	3
Hanson Improved	" 5	" 17	" 10	" 29	10	..
Simpson, Black-Seeded	" 5	" 17	" 10	" 29	8	..
Iceberg	" 5	" 17	" 10	" 29	9	5
All Heart	" 5	" 17	" 10	" 29	7	7
Giant Crystal Head	" 5	" 17	" 10	" 29	6	8

EARLY CABBAGE.

Five varieties of early cabbage were seeded on March 25 and April 15, in flats in the greenhouse, and these were later transplanted into flats on April 10 and April 27, and set in the open ground May 8 and June 10. The lot set in the open ground on

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June 10 should have been planted two weeks earlier but the planting was unavoidably delayed. The table given below is of interest in that it shows up the respective merits of the three principal early varieties. Copenhagen Market, Paris Market, and Early Jersey Wakefield for early market purposes. The Copenhagen Market while somewhat later in developing makes a much better head than either of the other two. The Copenhagen Market head is round and is liked much better than the Paris Market or Early Jersey Wakefield both of which are of the oxheart type. For the very early market it seems that the selected Early Jersey Wakefield is advisable, but, considering everything, it would appear that for general purposes the Copenhagen Market is the best.

For early cabbage there is a great advantage in having plants well developed and well hardened off in a cold frame for setting in the ground as early as possible. The planting in the open ground should not be delayed after the ground can be worked, and a frost, if the plants have been properly hardened off, will not do any injury. The early set cabbage for the first two weeks do not show growth in foliage but the roots meanwhile are becoming well established and when better growing weather approaches they develop into marketable heads rapidly.

Owing to the root maggot it is almost impossible to grow early cabbage without protecting the plants by using the tar felt disc which is fitted around the plant right after it is set. This disc is a piece of tar paper about 2½ inches in diameter with a slit cut in half-way and a small cross slit of about half an inch to enable it to fit as a collar with the plant in the centre of the disc. It should be fitted carefully about the plant on the surface of the ground in order to give the desired protection. This prevents the fly from depositing the eggs on the soil at the base of the plant from which the maggots hatch. Plants protected with these discs during the past season were 89 per cent marketable, and those not protected 27 per cent marketable.

EARLY CABBAGE.

Variety.	Seed sown.	First ready for use.	When harvested.	Average weight per head.	
				lb.	oz.
Copenhagen Market	Mar. 28	July 22	July 24, Aug. 5	4	1
Copenhagen Market	April 15	Aug. 20	Aug. 31, Sept. 12	4	3
Paris Market	Mar. 28	July 7	July 10, 16 and 24	2	1
Paris Market	April 15	Aug. 10	Aug. 10, 21 and 28	1	6
Early Jersey Wakefield	Mar. 28	July 8	July 11, 16 and 24	2	1
Early Jersey Wakefield	April 15	Aug. 10	Aug. 13, 21 and 28	2	..
Erfurt Small	Mar. 28	July 25	July 25, Aug. 5	2	4
Erfurt Small	April 15	Aug. 20	August 22	1	14
Summer Ballhead	Mar. 28	Aug. 9	Aug. 15 and 28	4	5
Summer Ballhead	April 15	Sept. 3	Sept. 8, 9 and 14	4	12

LATE CABBAGE.

For late cabbage it is not necessary to start the plants early, in fact plants set late in the open ground escape the root maggot and for that reason very many grow only late cabbage. There is also much less work attached to the growing of late cabbage. The plants are started in a cold frame, in good garden soil, the last week in April or first week in May. The seed is sown thinly in rows 4 to 6 inches apart so that the ground can be worked between the rows. Care is taken to give proper ventilation during the day and the frames are covered at night. As the season

advances a cheesecloth protection is spread over the frames to prevent the fly of the root maggot from entering. These plants, if given proper attention develop into thrifty plants which are set out about the middle to the last of June. It has been found that for early heads the Copenhagen Market is one of the best when grown in this way. Any of the Drumhead varieties make large heads on proper soil by the time winter approaches. The Danish Roundhead, a variety having a round compact head of excellent quality is one of the best for winter storage.

LATE CABBAGE.

Variety.	Seed sown.	Planted.	First ready for use.	Average weight of heads.	
				lb.	oz.
Copenhagen Market	May 13	July 13	Sept. 15	5	12
Summer Ballhead	" 13	" 13	" 15	4	2
Improved Brunswick	" 13	" 13	Oct. 10	5	
Large Late Flat Drumhead	" 13	" 13	" 10	5	13
Danish Roundhead	" 13	" 13	" 10	4	11

ONIONS.

Four varieties of onions were started in flats in the greenhouse March 24. The flats used were shallow boxes holding soil 2½ inches deep. The seed was scattered broadcast moderately thick, and covered to a depth of a quarter inch. A fairly rich garden soil was used. The plants were a fair size only when planted out on May 10.

To grow good plants at least eight weeks is required for growth in the flats and the seed should be started early in March. Plants can be started in such flats in a good sunny kitchen window. It is not a good plan to carry the plants at a high temperature, as they grow more rapidly but the plants are liable to be weak and spindly, whereas the low temperature plants are much more stocky and thrifty. As the plants grow in the flats the temperature should be gradually lowered. Good plants for transplanting cannot be produced by forcing the seedlings and it is much better to start the seed early, thus giving plenty of time for developing suitable plants.

The plants were well hardened off in a cold frame before planting, and set in rows 15 inches apart and 4 inches apart in the rows.

The soil on which these were grown was of medium fertility having been manured the two previous years with 20 tons of stable manure per acre. The land was in cabbage the previous year. The manure, which was well rotted, was applied in the fall and ploughed under. In the spring this was worked up with the disc and spring tooth harrow and acid phosphate at the rate of 400 pounds, and nitrate of soda at the rate of 150 pounds per acre were applied. Onions like a rich soil with plenty of early available plant food; poor soils will not give satisfactory returns.

Seed was also sown in the open ground as early as the ground could be worked, May 10, but the crop did not mature. It seems almost impossible to grow a profitable crop of onions under our climatic and soil conditions from seed sown in the open ground. On very rich soils it may be possible but certainly here it has been a failure during the past two years. The reason is that the plants do not make sufficient early growth to bring them to maturity early in September, and as the cool fall weather with rains comes on, the plants continue to grow and do not mature. The Extra

Early Red and Yellow Globe Danvers are the two best maturing varieties from seed planted in the field.

It would seem, therefore, that the practice of starting the onion seed in flats and transplanting the plants outside early is the only satisfactory method of onion culture for this country. The plants are easily raised and a great number can be grown in a small flat. The expense of transplanting is not much greater than the expense of thinning, and the plants can be transplanted with less loss than any of the vegetable plants. It should be remembered, however, that good thrifty plants stand transplanting much better than small spindling ones, and that good plants to start with can be secured only by starting the seed early. The plants should be ready for setting out as early as the ground can be worked so that the plants can get well established early in the spring. The following table gives the yield of four varieties grown during the past season from transplanted plants started as indicated above. The Prizetaker is one of the best onions for growing in this way. The plots were each one row 66 feet long.

Variety.	Well matured.		Not well matured but marketable.		Not marketable.		Total marketable per acre.	
	lb.	oz.	lb.	oz.	lb.	oz.	bush.	lb.
Extra Early Red	38	8	7	8	6	8	404	48
Yellow Globe Danvers	28	8	15	8	0	0	440	4
Large Red Wethersfield	28	8	16	12	4	4	398	12
Mammoth Prize Taker	19	4	33	8	0	8	464	10

Two varieties of onions were included in a test in 1914 to determine how best to handle the plants before setting in the open ground. Two lots of each were transplanted into flats in the greenhouse, one inch apart. The others were not transplanted except in the open ground, and one lot was sown February 3, another February 28, and the other March 17. The following table gives information regarding this test. The plants were set in the open ground on May 9. They were set in rows 15 inches apart and 6 inches apart in the row except the plants started February 3, which were planted 1 foot apart in the row. The crop was harvested September 25.

Variety.	Seed started.	When transplanted into flats.	Number of bulbs grown	Weight of bulbs.	Average weight of bulbs.
				lb.	oz.
Prize Taker	Feb. 3	Mar. 2	94	145	24·5
Prize Taker	" 28	" 30	44	44	16·0
Prize Taker	" 28	.....	37	26	11·0
Prize Taker	Mar. 17	.....	63	33	8·3
Ailsa Craig	Feb. 3	Mar. 2	98	142	23·2
Ailsa Craig	" 28	" 30	42	36	13·6
Ailsa Craig	" 28	.....	49	30	9·7
Ailsa Craig	Mar. 17	.....	27	27	6·0

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GARDEN PEAS FOR SEED.

Five varieties of garden peas were planted for seed production May 18, in plots of one-fifteenth acre each. These were seeded with the grain drill at the rate of 2½ bushels per acre. The soil on which these were planted was of medium fertility and had been in corn in 1915. The ground was fertilized with ground limestone at the rate of 1 ton per acre and 400 pounds of acid phosphate per acre. The yield was as follows:—

	Yield per acre.	
	Bush.	Lb.
Excelsior	11	24
Thomas Laxton	13	30
Gradus	13	—
Admiral Dewey	13	45
Stratagem	10	15

FIELD BEANS.

Two varieties of field beans were planted May 26, in plots of one-sixth acre each. The seed was sown with the hand drill in rows 30 inches apart.

The land had previously been in corn and was fertilized with 400 pounds of acid phosphate per acre. The soil is a sandy loam of medium fertility.

The crop ripened well and was fit for harvesting September 21. The following yields per acre were obtained:—

	Bush.	Lb.
Common Yellow-eye	14	12
White Kidney	16	30

POTATOES.

TEST OF VARIETIES.

The ground on which the different varieties of potatoes were planted was in potatoes in 1913 and corn in 1914, having been manured for the corn at the rate of 15 tons stable manure per acre. The land was ploughed in the fall after the corn was cut, and it was again ploughed this spring. It was fertilized with 600 pounds acid phosphate, 200 pounds nitrate of soda and 100 pounds of muriate of potash per acre.

The planting was done May 20 and the crop was dug September 24. The seed was planted in rows 33 inches apart and one foot apart in the rows. The plants were cultivated five times, and poisoned Bordeaux mixture was used three times. The poisoned Bordeaux used was made up of 4 pounds bluestone and 4 pounds lime to 40 gallons water, to which was added one-half pound Paris green and 1½ pounds arsenate of lead to 40 gallons.

The plants on the majority of the plots seemed to lack in vigour. The disease rhizoctonia noticeably weakened many of the plants and in some cases as a result the plants died prematurely. There was no loss from late blight. The season on the whole was not entirely favourable for potatoes and the crop in general was light. The results obtained are given in the following table:—

POTATOES—Test of Varieties.

Name.	Marketable.	Not marketable.	Total Yield.
	Bushels per acre.	Bushels per acre.	Bushels per acre.
Todd Wonder	236	10	246
Sir Walter Raleigh	200	24	224
Clyde	154	38	192
Manistee	157	34	191
New Queen	146	32	178
Silver King	132	32	164
Rawlings Kidney	126	34	160
Dobbie Prolific	144	14	158
Carman No. 1	128	22	150
Vicks	120	28	148
Early Rose	118	27	145
Empire State	118	26	144
Irish Cobbler	86	58	144
Dreer Standard	117	27	144
Wee McGregor	114	24	138
Burbank	118	16	134
Wonderful	108	24	132
Vermont Gold Coin	112	20	132
McIntyre	92	34	126
Early Hebron	100	24	124
Eureka Extra Early	62	60	122
Green Mountain	86	34	120
New Scotch Rose	96	24	120
Early White Albino	92	22	114
Up-To-Date	90	20	110
Dalmeny Hero	68	25	93
Early Ohio	75	18	93
Bliss Triumph	55	37	92
Pan American	62	26	88
McCullough	58	25	83
Black Kidney	28	52	80
Bovee	64	16	80
Early Norther	46	30	76
Acquisition	40	34	74
Snow	44	24	68
Morgan Seedling	46	20	66
Factor	38	18	56
Table Talk	18	32	50
Conquering Hero	26	23	49
Scottish Triumph	30	12	42

HALF-ACRE PLOTS OF GREEN MOUNTAIN AND DELAWARE POTATOES.

One-half acre plots of Green Mountain and Delaware potatoes were planted on new ground June 1. The land was manured with 15 tons stable manure per acre, which was ploughed under. Acid phosphate at the rate of 400 pounds per acre was also applied. These made a very strong growth. The plants were sprayed three times with poisoned Bordeaux mixture July 13, July 20 and August 6. There was no blight. The crop was dug September 24. The yield per acre was as follows:—

Name.	Marketable. Bush.	Lb.	Not Marketable. Bush.	Lb.	Total Yield. Bush.	Lb.
Delaware	187	20	26	40	213	40
Green Mountain	181	..	27	20	208	20

IRISH COBBLER AND GREEN MOUNTAIN.

Two one-half acre plots of Irish Cobbler and Green Mountain were planted on a piece of ground that had been in potatoes the two previous years. The reason for using this land was that there was no other land available. The land was in corn in 1913 on which no stable manure was used and it was fertilized for the corn at the rate of 400 pounds complete fertilizer per acre and gave a crop of only 4 tons, 100 pounds ensilage corn per acre. This same land was in potatoes in 1914, having been fertilized with 600 pounds of complete fertilizer per acre containing 4 per cent nitrogen, 8 per cent phosphoric acid and 5 per cent potash, and produced 137 bushels potatoes per acre. The ground was fall ploughed after the potatoes were dug and in the spring of 1915 again ploughed after which 600 pounds acid phosphate, 200 pounds nitrate of soda and 100 pounds of muriate of potash per acre were scattered broadcast and harrowed in before planting. The seed was planted in rows 33 inches apart and one foot apart in rows. The plants were well cultivated and sprayed three times with poisoned Bordeaux.

The crop on this field was a complete disappointment. The trouble seemed to be largely due to rhizoctonia which prevented the plants from making a vigorous growth and they maintained a stunted dwarf appearance and prematurely dried up. The yield per acre was as follows:—

Name.	Marketable. Bushels. Per acre.	Not Marketable. Bushels. Per acre.	Total Yield Bushels. Per acre.
Irish Cobbler	41	20	61
Green Mountain	75⅞	18	93⅜

POTATOES CUT IN DIFFERENT WAYS.

In order to find out the value of cutting seed tubers into pieces having one or more eyes, tests were made with Empire State and Table Talk. The whole potatoes averaged 36 bushels seed planted per acre; 1-eye pieces, 17 bushels; the 2-eye pieces, 24 bushels; the 3-eye pieces, 36 bushels; and the ordinary planting, 18 bushels per acre. The 1-eye pieces averaged 1 ounce to a set; the 2-eye pieces 1½ ounces; and the 3-eye pieces, 2 ounces to a set. The seed was planted 1 foot apart in the row and the rows were 33 inches apart.

The land on which these tests were made had not previously been in potatoes. It was manured at the rate of 15 tons stable manure per acre and acid phosphate at the rate of 400 pounds per acre was scattered broadcast and harrowed in before planting.

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The yields from these tests are given in the following table:—

	Yield per Acre.		
	Marketable.	Unmarketable.	Total Yield.
	Bushels	Bushels	Bushels
Table Talk, cut the same as field lots	168	40	208
" cut to 1 Eye	180	34	214
" cut to 2 eyes	194	50	244
" cut to 3 eyes	214	42	256
" whole small to medium potatoes	122	46	168
Empire State, cut same as field lots	156	18	174
" cut to 1 eye	154	18	172
" cut to 2 eyes	212	30	242
" cut to 3 eyes	184	30	214
" whole small to medium potatoes	216	28	244

POTATOES PLANTED DIFFERENT DISTANCES APART.

In order to find out whether close planting is advisable a series of tests was made in planting potatoes in rows 2½ and 3 feet apart and in planting the sets 12 and 14 inches apart in the row. The land was similar to that in which the tests with seed cut in different ways were conducted. The yield per acre from these tests is given in the following table:—

	Marketable.		Unmarketable.		Total Yield.	
	Bush.	lb.	Bush.	lb.	Bush.	lb.
Green Mountain, 12 inches by 2½ feet	207	45	36	15	244	
Irish Cobbler, " " " "	189		38	30	227	30
Green Mountain, 14 " " "	208	30	37		245	30
Irish Cobbler, " " " "	200		37		237	
Green Mountain, 12 " 3 "	176		25	40	201	40
Irish Cobbler, " " " "	112		25	40	137	40
Green Mountain, 14 " 3 "	183	20	22		205	30
Irish Cobbler, " " " "	128	20	27	30	155	50

GARNET CHILI POTATOES FROM DIFFERENT SOURCES.

In order to find out whether a variety of potatoes as grown by different farmers if brought together and given uniform conditions will produce equally well, a series of tests was conducted with the Garnet Chili potato. The crop was planted on land manured with 15 tons stable manure and 400 pounds acid phosphate per acre.

The different lots were given similar treatment in every way and were in rows adjoining each other. It will be noticed that there was a marked difference in the yield and this difference seemed largely to centre around the vigour of the plant, enabling them to resist the rhizoctonia disease, which was present in the soil, and the development of which the season seemed to favour. These same potatoes will be tested again next season. The results obtained are given in the table below.

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GARNET CHILI POTATOES FROM DIFFERENT GROWERS.

Number of grower.	Marketable.	Unmarketable.	Total.
	Bushels per acre.	Bushels per acre.	Bushels per acre.
1	220	20	240
2	94	26	120
3	212	14	226
4	186	20	206
5	26	10	36
6	32	14	46
7	176	34	210
8	52	22	74

SWEET PEA.

Sweet peas grow well on the ordinary garden soil provided it is drained so that water will not lie on the surface after heavy spring rains. A sunny location should be chosen. Plants grown in a shady situation are usually weak and produce few flowers. A close bright situation with little air circulation, where the plants are subject to the extreme midday heat of summer, should be avoided. The sweet pea likes a cool moist soil during the summer and every effort should be put forward to furnish these conditions if good bloom is to be secured.

The ground used for these flowers at Kentville, which is a sandy loam, is prepared by trenching to a depth of 12 inches and about 15 inches wide. The top 6 inches of soil is kept separate from the subsoil. Into this trench 5 inches of manure is scattered and this is worked over a little by mixing it with about half of the subsoil removed, after which the manure and soil is packed somewhat by tramping. The surface soil is then put on about 4 inches deep and this is mixed with some well rotted fine manure. Two ounces of ground limestone, 1 ounce of slag, and 1 ounce of bone meal is then added to each yard of trench and well worked into the soil. The seed is then planted by running out a drill about 2 inches deep and the seed is covered about one inch.

As the plants develop earth is gradually worked up around the plants until the trench is filled level, and as the summer heat becomes great a mulch of litter, or strawy horse manure, is placed each side of the row of plants. This holds the moisture and keeps the roots cool on our light soils.

Tests have been made during the past two years of plants started in pots in the greenhouse and planted out as compared with those started in the open ground. For this work four varieties have been used, King Edward Spencer (Red), King White (White), Countess Spencer (Pink), and Tennant Spencer (Lavender). Beatrice Spencer (White), was used in place of King White in 1914. These are five excellent varieties.

Ten 4-inch pots of each variety were seeded with from 5 to 6 seeds and the plants were later thinned out to three plants to a pot. When set to the open ground the earth in which the plants were growing was not broken, thus preventing any check in growth, and the contents of each pot were placed one foot apart in the row, the top about one inch below the surface. The plants were well hardened off by allowing them to remain in the cold frame and in the open a week before planting. The early sown plants were about 7 to 8 inches high and the later sown ones 5 to 6 inches high when set out. In order to support the plants in the pots small twigs are stuck into the soil. It will be seen that this method of getting early bloom is one well worth recommending and the work attached to it is not very great. The plants grown in pots were set in the open

ground on May 4, in 1914, and on May 11 in 1915, on the same dates that the seed of those grown entirely outside was sown. The date of planting and date of bloom is given in the following table:—

Variety. 1914.	When started in pots.	Set to the open ground.	Date of first Bloom.
Beatrice Spencer	March 18	May 4	July 6
King Edward Spencer	" 18	" 4	" 7
Countess Spencer	" 18	" 4	" 8
Tennant Spencer	" 18	" 4	" 4
Beatrice Spencer	April 1	" 4	" 12
King Edward Spencer	" 1	" 4	" 10
Countess Spencer	" 1	" 4	" 12
Tennant Spencer	" 1	" 4	" 12
	Planted in the open ground.		
Beatrice Spencer	May 4		" 25
King Edward Spencer	" 4		" 25
Countess Spencer	" 4		" 25
Tennant Spencer	" 4		" 25
1915.	When planted in pots.		
King White	March 27	May 11	" 1
King Edward Spencer	" 27	" 11	" 6
Countess Spencer	" 27	" 11	" 1
Tennant Spencer	" 27	" 11	" 6
King White	April 13	" 11	" 10
King Edward Spencer	" 13	" 11	" 12
Countess Spencer	" 13	" 11	" 13
Tennant Spencer	" 13	" 11	" 12
	Planted in the open ground.		
King White	May 11		August 3
King Edward Spencer	" 11		" 3
Countess Spencer	" 11		" 3
Tennant Spencer	" 11		" 2

In addition to the five varieties of sweet peas named above the following twelve sorts were considered the best out of sixty-five varieties tested: King Manoel, rich maroon; Mrs. Townsend, white-edged blue; Mrs. C. W. Breadmore, buff edged rose; Captain of the Blues, blue; Mrs. Hugh Dickson, cream salmon pink; Helen Lewis, orange salmon pink; Elfrida Pearson, pale pink; Clara Curtis, primrose; Senator, chocolate stripes; Asta Ohn, lavender overlaid with rose; Thomas Stevenson, orange scarlet; and Maud Holmes, crimson.

SHRUBS.

The various shrubs planted in the spring of 1913 and 1914 have become well established and have made sufficient growth to add much to the attractiveness of the ground. The growth is not very rapid on the poor light sandy soil on which these are growing, but after they become established there is no advantage in forcing the growth provided they remain healthy and vigorous, for a small healthy shrub is as attractive as a large one. The following list includes varieties which we can recommend as suitable for home planting, owing to their hardiness, and attractiveness of foliage, bloom, or fruit:—

Japanese Barberry (*Berberis Thunbergii*).
Siberian Pea Tree (*Caragana arborescens*).
Red-stemmed Dogwood (*Cornus alba Sibirica*).
Japanese Quince (*Cydonia japonica*).
Weeping Golden Bell (*Forsythia suspensa*).
Golden Bell (*Forsythia Fortunei*).
Japanese Hydrangea (*Hydrangea paniculata grandiflora*).
Yellow-flowering Currant (*Ribes aureum*).
Japanese Rose (*Rosa rugosa*).
Golden Elder (*Sambucus aurea*).
Cut-leaved Elder (*Sambucus nigra laciniata*).
Bridal Wreath Spiraea (*Spiraea Van Houttei*).
Dwarf Bridal Wreath Spiraea (*Spiraea arguta*).
Spiraea Anthony Waterer (*Spiraea Bumalda Anthony Waterer*).

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Bush Honeysuckle (*Lonicera tatarica rubra*).
Bush Honeysuckle (*Lonicera Morrowi*)
Sweet Mock Orange (*Philadelphus coronarius*).
Large-flowered Mock Orange (*Philadelphus grandiflorus*).
Smoke Bush (*Rhus Cotinus*).
Golden Spiraea (*Spiraea opulifolia aurea*).
Snowberry (*Symphoricarpus racemosus*).
Common Snowball (*Viburnum Opulus sterile*).
High Bush Cranberry (*Viburnum Opulus*).

EVERGREENS.

The evergreens planted at this Station have made very indifferent growth, but are now getting established and are commencing to add appreciably to the beauty of the grounds. The following are particularly desirable:—

Colorado Blue Spruce (*Picea pungens*).
Stone Pine (*Pinus Cembra*).
Dwarf Mountain Pine (*Pinus montana Mughus*).
Savin Juniper (*Juniperus Sabina*).
Thread-leaved Cypress (*Retinospora pisifera filifera*).
Plume-like Cypress (*Retinospora pisifera plumosa*).
Hovey's Arborvitæ (*Thuya occidentalis Hoveyi*).
Pyramidal Arborvitæ (*Thuya occidentglis pyramidalis*).
Compact Arborvitæ (*Thuya occidentalis compacta.*)
Siberian Arborvitæ (*Thuya occidentalis Wareana*).

STRAWBERRIES.

Four varieties of strawberries were tested in one-twentieth acre plots. The plants were set May 14, in the spring of 1914. The ground was manured with 15 tons well rotted manure per acre in the spring and ploughed under. Five hundred pounds of complete fertilizer per acre was scattered broadcast and harrowed in before planting. The plants were set in rows 4 feet apart and 1 foot apart in the row. The yield from these plots is given in the table below.

	First Picking.	Last picking.	Date of largest picking.	Yield per acre boxes.
Pocomoke	July 6	July 26	July 16	5,575
Senator Dunlap	" 6	" 22	" 14	4,660
Sample	" 6	" 28	" 16	4,420
Stevens Late Champion	" 10	" 31	" 22	3,148

VALUE OF PLANTING GOOD STRONG STRAWBERRY PLANTS.

In order to test the value of using strong well-developed strawberry plants two one-fortieth-acre plots were planted at the same time. The plants in plot 1 were the best ones available and those on plot 2 were the small runner plants from the same plot which had developed late the previous season. The results would seem to show that every effort should be made to use only the best developed year-old plants for setting out a new plantation.

Plot 1 from large well developed plants, 5,177 boxes.
Plot 2 from small plants, 2,245 boxes.

EXPERIMENTAL ORCHARD WORK.

Experiments were continued this season at Berwick, Falmouth, and Bridgetown in the same orchards used for this work two preceding years. The experiments have for the most part been confined to apple scab control, using both the lime-sulphur and soluble sulphur to which lead arsenate had been added for insect control.

The object of the experiments is to clear up certain points in connection with the time of application for the best control of apple scab and from the results it would appear that the greatest loss to growers has been caused from early scab infection due

to not giving close enough attention to the early sprays before blossoming. It seems very desirable to give one thorough spray just after the leaves are nicely out and another before the blossoms open. Thorough work at this time is of utmost importance in order properly to protect the foliage from disease.

There seems to be no advantage in using a dormant spray. A slight reduction of apple scab apparently followed the dormant application in many instances but the difference between the plots where the dormant spray was used, and the regular without the dormant spray is so little that it would not be of economic advantage. It also appears that there is no advantage in using a strength greater than the regular 1·008 specific gravity test. The practice of making the early sprays stronger than the regular summer spray does not seem to be necessary for scab control.

A number of tests have been made with the soluble sulphur as compared with lime-sulphur and the results are rather conflicting. The control of scab was fairly good at Bridgetown and Falmouth, but was not satisfactory at Berwick. It would appear that soluble sulphur does not adhere to the foliage as well as lime-sulphur and heavy rains following soon after the application may very materially lessen the effectiveness of the spray and cause burning.

The foliage injury resulting from the soluble sulphur when combined with arsenate of lead renders this spray quite unsatisfactory. As pointed out last season the neutral leads do cause less burning than the acid leads but the amount of burning with neutral leads is too great to make the question of kind of arsenate of lead a factor of great consequence. It would seem that some quite different insecticide will have to be used with soluble sulphur before it can be considered a satisfactory spray.

Different preparations put in the soluble sulphur arsenate spray to eliminate the foliage injury have improved the spray somewhat in this regard, but are not considered to be of sufficient value to be of practical use.

It would appear from what can be gathered up to the present that four thorough applications of lime-sulphur-arsenate, two sprays before blossoms and two after will prove the most satisfactory and ensure practically clean fruit with little foliage injury. With much dark damp weather during the spraying period or following a thorough application some injury is liable to result from lime-sulphur but this injury usually is only very slight. The injury seems in every case to be due to the combination formed from the arsenate of lead and sulphur compounds when the two are mixed together and these compounds after they have dried on the trees are influenced again apparently by the weather following the application.

I am indebted to my assistant Mr. R. D. L. Bligh for the records secured at Berwick and Falmouth, and to Mr. M. P. Pike for the records obtained at Bridgetown. We have made every effort to avoid error in the work and have duplicated the experiments at each orchard as much as possible.

In considering these results it should be kept in mind that we depend entirely upon the hydrometer test in making our lime sulphur sprays. Were all brands of commercial concentrated lime-sulphur of the same density this would be unnecessary, but there may be a variation in density of from 1·26 to 1·30 in this product in which case a gallon of the 1·26 specific gravity concentrate if added to 40 gallons would give a much weaker spray than if one gallon of the 1·30 specific gravity concentrate is added to 40 gallons. The method to follow is to first test the concentrate one is using.

We were using the Grasselli concentrated lime-sulphur which gave 1·30 specific gravity test. In order to find out the dilution required for a spray of 1·008 density the decimal of this spray is divided into the decimal concentrate thus:—

$$\frac{(1)\cdot 300}{(1)\cdot 008} = 37\tfrac{1}{2} \text{ gallons.}$$

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or one gallon should be diluted to make 37½ gallons of spray. If a concentrate has 1·26 specific gravity test and a 1·008 spray is desired you would proceed as follows: (1)·260

————— 32½ gallons of spray, or 1 gallon should be diluted to make 32½ gallons of (1)·008

spray. Any reference made as to the dilution in this report is based on the specific gravity test of the Grasselli concentrated lime-sulphur.

The approximate date of full bloom at the different orchards was as follows:—

Variety.	Bridgetown.	Berwick.	Falmouth
Gravenstein	June 4	June 3	June 6
Golden Russet	" 6	" 8	" 10
Tompkins King	" 6	" 6	" 8
Baldwin	" 9	" 8	—
Blenheim	" 7	" 8	—
Stark	" 6	" 8	—
Ben Davis	" 10	" 10	—
Ribston	" 6	" 6	" 8
Roxbury Russet (Nonpareil)	" 8	.....	—
Northern Spy	" 10	" 10	" 12

The dates of application have varied somewhat at the different orchards, but in all comparative tests the sprays were applied on the same days. In the majority of the tests two sprays were put on before the blossoms and two after.

It is interesting to note that from the 15th May when first spraying work at Berwick started there was more or less sunshine every day to the end of the month except on the 16th, 18th, 22nd, and 28th. Rain fell the 15th, 16th, 18th, 19th, 22nd, 23rd, 24th, 27th, and 29th, the total precipitation however was only 0·85 inch, of which 0·42 fell on the nights of the 19th and 27th. It will be seen, therefore, that the weather to June 1, was fairly favourable for scab development. From the 1st to the 6th June, inclusive, the weather was unusually bright and unfavourable for scab development and favourable for blossoming. This was followed by dark weather on the 10th and 11th. Rain fell on four days following the 8th, which amounted to 1·01 inches, over half of which fell on the 9th, when the blossoms were at their best, after which they soon disappeared. It will be seen that the time during the latter part of the blooming period was particularly favourable for scab development. The next two weeks following the 11th June was more or less dark, with rain on eight days.

It will be noticed that the greatest foliage injury occurred when rain and dark weather followed the application of the spray, and also that the soluble sulphur plots showing the greatest per cent scab were those which had a rather sharp fall of rain the day following the application which would seem to indicate that soluble sulphur is less adhesive than lime sulphur.

The orchards used are fairly well matured and three trees have been used to each experiment. The aim has been to make comparative tests with trees which have been developed under apparently similar conditions and adjoining each other, and for this reason there may be some difference in the results from the same spray on the different series of plots. In every case the product of the plot has been carefully sorted and the percentage of slight, medium, and bad scab obtained. In many cases the per cent of scab was only slight, which fact is not shown in the total per cent here given. It has been noticed that plots adjoining the check plots often show a decidedly high per cent of scab, and this is what we might expect. Plots for a check, however, left unsprayed are necessary in order to check up the work.

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DORMANT VERSUS NO DORMANT SPRAY.

Experiments were continued this season to get further information as to the value of the dormant spray put on before the buds open to control scab. Different strengths of lime-sulphur were used in these early sprays and the results would seem to show some gain, although the gain is not sufficient to make this a necessary spray. It will be noticed that the per cent of scab from nine plots is 7·13 per cent and that this does not include two plots at Bridgetown where there was 36 and 21 per cent of scab. These two plots were high in scab owing to being adjacent to a plot not sprayed, which resulted in a light late infection, and were these included the average would be 11·51 per cent scab on the plots receiving other than dormant spray.

It will also be noticed that tests have been made with varying strengths of lime-sulphur for the first spray with the three following sprays similar. It would appear from this that there is no advantage in using a strength greater than that generally used for summer for this spray. The plot where the 1·010 strength was used was also adjacent to a check plot and the high per cent of scab in it can in this way be accounted for. The results would seem to confirm previous experiments that the dormant spray is of little value and that a strength of spray greater than 1·008 is unnecessary.

VALUE OF THE DORMANT SPRAY.

Place where test made and variety.	Time of application.					Per cent Scab.
Berwick	April 26	May 17	June 1	June 15	July 2	
Gravenstein	1·014	1·008	1·008	1·008	1·008	12·4
"		1·008	1·008	1·008	1·008	16·2
Not sprayed						91·0
Ben Davis	1·014	1·008	1·008	1·008	1·008	3·7
"		1·003	1·008	1·008	1·008	4·5
Not sprayed						75·3
			May 31	June 14	July 1	
Tompkins King	1·032	1·008	1·008	1·008	1·008	2·1
"	1·014	1·008	1·008	1·008	1·008	·3
"	1·008	1·008	1·008	1·008	1·008	2·3
"		1·008	1·008	1·008	1·008	7·7
Not sprayed						92·8
	April 27					
Gravenstein	1·032	1·008	1·008	1·008	1·008	6·1
"	1·014	1·008	1·008	1·008	1·008	4·5
"	1·008	1·008	1·008	1·008	1·008	8·4
"		1·008	1·008	1·008	1·008	10·1
Not sprayed						87·4
Bridgetown	April 28	May 17	May 28	June 15	June 25	
Gravenstein	1·028	1·008	1·008	1·008	1·008	8·0
"		1·008	1·008	1·008	1·008	21·0
"		1·010	1·008	1·008	1·008	11·
Not sprayed						98·0
		May 18	May 28	June 15	June 26	
Gravenstein	1·028	1·008	1·008	1·008	1·008	8·5
"		1·008	1·008	1·008	1·008	36·0
Not sprayed						93·2
Tompkins King	1·028	1·008	1·008	1·008	1·008	8·04
"		1·008	1·008	1·008	1·008	6·47
Not sprayed						57·18
Ben Davis	1·028	1·008	1·008	1·008	1·008	6·83
"		1·008	1·008	1·008	1·008	8·07
Not sprayed						73·61
Roxbury Russet (Nonpareil)	1·028	1·008	1·008	1·008	1·008	3·77
" "		1·008	1·008	1·008	1·008	3·44
Not sprayed						42·0
Stark	1·028	1·008	1·008	1·008	1·008	6·77
"		1·008	1·008	1·008	1·008	8·62
Not sprayed						62·71
Berwick		May 19	June 8	June 18	July 1	
Spy		1·014	1·008	1·008	1·008	3·6
"		1·009	1·008	1·008	1·008	3·55
"		1·008	1·008	1·008	1·008	4·47
"		1·007	1·008	1·008	1·008	4·29
Not sprayed						95·2

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DORMANT versus NO DORMANT.

Number of Experiments.	Summary.	Per cent. Scab.
2 Dormant spray	1·932 sp. gr., or 1 to 9½ gals. and four sprays 1·008	4·1
6 " "	1·028 " 1 " 10½ " " 1·008	7·4
4 " "	1·014 " 1 " 21 " " 1·008	5·2
2 " "	1·008 " 1 " 37 " " 1·008	5·3
9 No Dormant spray	1·008	7·13
11 No spray		78·95

Different Strengths in the first Foliage Spray.

1 First foliage spray	1·014 sp. gr., 1 to 21 gals. and three sprays 1·008	3·6
1 " "	1·010 " 1 " 30 " " 1·008	11·0
1 " "	1·009 " 1 " 37 " " 1·008	3·5
1 " "	1·008 " 1 " 37 " " 1·008	9·5
1 " "	1·007 " 1 " 43 " " 1·008	4·9
	Average of above five sprays " 1·008	6·5
7 No first foliage spray.		13·94
11 No spray.		78·95

SPRAYING AT DIFFERENT DATES.

In order to gather further information as to the value of the early sprays as compared with the later ones a series of tests in which the plots were sprayed twice before, and twice after the blossoms, were compared with those sprayed once before the blossoms and twice after.

In one series of experiments the one spray before the blossoms was put on about midway between the first spray, which was put on just after the leaf buds were nicely opened May 17, and the second spray put on just before the first petals opened May 31, or just before or about the time the blossom clusters were showing pink, this we have called a midway spray.

In the other test the one spray before blossoms was put on just before the petals of the flower clusters opened.

It will be noticed from the summary of the lime-sulphur-arsenate plots below that there was a difference of from two to three per cent only in favour of two sprays before the blossoms and that the two most important sprays were the ones just before and just after blossoming. From results obtained it would seem that should the period between the opening of the leaf buds and the opening of the petals of the flower clusters be short owing to weather conditions one spray may be sufficient to give practically clean fruit, but should this period be extended two sprays should be given.

A study of results from the soluble sulphur plots sprayed at different dates as shown by the summary indicates that the early spray was quite an important one and that two applications before the blossoms were advisable. It is interesting to note also, that on the day following the application of the midway spray at Berwick there was a sharp rainfall of about one-quarter inch as was the case with the spray after blossoming which would show that soluble sulphur is not an adhesive spray and that a heavy quick rainfall may reduce its fungicidal value and bring about increased burning also, as was the case with these sprays.

It would seem, therefore, that from our present knowledge it is wise to make two applications before blossoms; first after the leaf buds open, and second just before the blossoms open which dates correspond with those advised for the best control of insects.

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SPRAYING AT DIFFERENT DATES.

Place where test made and Variety.	Time of application.					Per cent of Scab.
Berwick—	May 17	May 26	May 31	June 14	July 2	
Gravenstein	1·008		1·008	1·008	1·008	10·1
"			1·008	1·008	1·008	14·30
"		1·008		1·008	1·008	15·2
"				1·008	1·008	31·3
"					1·008	88·7
" no spray						87·4
Tompkins King	1·008		1·008	1·008	1·008	7·7
"		1·008		1·008	1·008	10·3
" no spray						92·8
			June 1	June 15		
Gravenstein	1·008		1·008	1·008	1·008	16·8
"		1·008		1·008	1·008	24·2
" no spray						91·0
Ben Davis	1·008		1·008	1·008	1·008	3·1
"		1·008		1·008	1·008	3·49
" no spray						75·3
Twenty Ounce	1·008		1·008	1·008	1·008	0·6
"		1·008		1·008	1·008	0·8
Ribston	1·008		1·008	1·008	1·008	1·9
"		1·008		1·008	1·008	3·3
Stark	1·008		1·008	1·008	1·008	5·5
"		1·008		1·008	1·008	4·2
" no spray						70·5
Falmouth—	May 24	May 26	June 4	June 25	July 13	
Northern Spy	1·008		1·008	1·008	1·008	0·67
"			1·008	1·008	1·008	3·0
" no spray						51·4
Golden Russet	1·008		1·008	1·008	1·008	3·0
"			1·008	1·008	1·008	2·9
" no spray						34·2
Tompkins King	1·008		1·008	1·008	1·008	0·7
"		1·008		1·008	1·008	2·5
" no spray						31·1
Bridgetown—	May 17	May 24	May 28	June 15	June 25	
Gravenstein	1·008		1·008	1·008	1·008	21·0
"			1·008	1·008	1·008	30·0
"		1·008		1·008	1·008	29·0
" no spray						98·0
	May 18	May 28	June 15	June 26		
Gravenstein	1·008	1·008	1·008	1·008		36·0
"		1·008	1·008	1·008		25·7
" no spray						93·2
Tompkins King	1·008	1·008	1·008	1·008		6·47
"		1·008	1·008	1·008		7·86
" no spray						57·18
Stark	1·008	1·008	1·008	1·008		8·62
"		1·008	1·008	1·008		6·58
" no spray						62·71
Ben Davis	1·008	1·008	1·008	1·008		8·07
"		1·008	1·008	1·008		8·79
" no spray						73·61
Roxbury Russet (Nonpareil)	1·008	1·008	1·008	1·008		3·44
" "		1·008	1·008	1·008		4·33
" " no spray						42·00

SOLUBLE Sulphur Applied at Different Dates.

Place Where Test Made and Variety.	Time of application.					Per cent of Scab.
Berwick	May 17	May 26	June 1	June 15	July 2	
Gravenstein	1½-½-100	.....	1½-½-100	1½-½-100	1½-½-100	31·5
Tompkins King	1½-½-100	.....	1½-½-100	1½-½-100	1½-½-100	8·8
Baldwin	1½-½-100	.....	1½-½-100	1½-½-100	1½-½-100	0·0
Golden Russet	1½-½-100	.....	1½-½-100	1½-½-100	1½-½-100	13·2
Average of four varieties	.....	.....	.....	.....	.....	13·4
Gravenstein	.....	1½-½-100	.....	1½-½-100	1½-½-100	40·8
Tompkins King	.....	1½-½-100	.....	1½-½-100	1½-½-100	37·7
Baldwin	.....	1½-½-100	.....	1½-½-100	1½-½-100	17·1
Golden Russet	.....	1½-½-100	.....	1½-½-100	1½-½-100	17·8
Average of four varieties	.....	.....	.....	.....	.....	28·1
	May 17	May 27	May 31	June 14	July 2	
Gravenstein	1½-½-100	.....	1½-½-100	1½-½-100	1½-½-100	47·6
"	.....	.....	1½-½-100	1½-½-100	1½-½-100	47·0
"	.....	1½-½-100	.....	1½-½-100	1½-½-010	45·4
" No spray	.....	.....	.....	.....	.....	87·4
Falmouth		May 24	June 4	June 25	July 13	
Gravenstein	.....	1½-½-100	1½-½-100	1½-½-100	1½-½-100	8·9
Northern Spy	.....	1½-½-100	1½-½-100	1½-½-100	1½-½-100	4·2
Golden Russet	.....	1½-½-100	1½-½-100	1½-½-100	1½-½-100	7·8
Average of three varieties	.....	.....	.....	.....	.....	6·9
Gravenstein	.....	.....	1½-½-100	1½-½-100	1½-½-100	25·7
Northern Spy	.....	.....	1½-½-100	1½-½-100	1½-½-100	18·4
Golden Russet	.....	.....	1½-½-100	1½-½-100	1½-½-100	21·3
Average of three varieties	.....	.....	.....	.....	.....	21·4
Gravenstein, no spray	.....	.....	.....	.....	.....	43·2
Northern Spy, no spray	.....	.....	.....	.....	.....	51·4
Golden Russet, no spray	.....	.....	.....	.....	.....	32·2
Average of three varieties	.....	.....	.....	.....	.....	42·9

SPRAYS APPLIED AT DIFFERENT DATES.

SUMMARY.

Number of Experiments.	Lime-Sulphur 1·008 Specific Gravity or One gallon Concentrate to make 37 gals. spray and 5 lbs. Arsenate of Lead to 100 gallons.	Per cent of Scab.
16	Two before and two after blossoms	8·35
9	One before blossoms, midway between first and second and two after blossoms	11·48
9	One just before and two after blossoms	10·33
1	Two after blossoms only	31·30
1	One two weeks after blossoms	88·70
14	No spray	68·6
	Soluble Sulphur 1½ lbs. and 5 lbs. Arsenate of lead to 100 gallons.	
8	Two before and two after blossoms	16·8
5	One before blossoms, midway between first and second and two after blossoms	36·7
4	One just before and two after blossoms	34·2
4	No spray	65·1

SOLUBLE SULPHUR VERSUS LIME SULPHUR.

A number of tests have been made with soluble sulphur-arsenate of different strengths to compare with lime-sulphur-arsenate for apple scab control, and the results as given in the summary would go to show that the scab control was slightly

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better at Falmouth with lime-sulphur-arsenate than with soluble sulphur-arsenate; at Berwick the control was decidedly better with lime-sulphur-arsenate, and at Bridgetown the soluble sulphur-arsenate gave the best control. As already pointed out the first spray after blossoming at Berwick was followed the next day with sharp rain which may have washed off some of the spray resulting in the large percentage of scab shown.

Arsenate of lead at the rate of five pounds per 100 gallons was used in each spray. Two sprays were given before and two after blossoming.

SOLUBLE SULPHUR versus LIME SULPHUR.

Where Test made and variety.	Time of application.					Per cent Scab.
Berwick		May 17	May 31	June 14	July 2	
Gravenstein	S.S.	1½-100	1½-100	1½-100	1½-100	42·0
"	"	2½-100	2½-100	2½-100	2½-100	36·7
" no spray						87·4
"	L.S.	1·008	1·008	1·008	1·008	10·1
Falmouth		May 24	June 4	June 25	July 13	
Gravenstein	S.S.	1½-100	1½-100	1½-100	1½-100	6·4
"	"	2 -100	2 -100	2 -100	2 -100	4·7
"	"	2½-100	2½-100	2½-100	2½-100	6·3
" no spray						43·3
Northern Spy	S.S.	1½-100	1½-100	1½-100	1½-100	0·0
"	"	2 -100	2 -100	2 -100	2 -100	2·2
"	"	2½-100	2½-100	2½-100	2½-100	2·1
" no spray						51·4
"	L.S.	1·008	1·008	1·008	1·008	·67
Golden Russet	S.S.	1½-100	1½-100	1½-100	1½-100	8·9
"	"	2-100	2 -100	2 -100	2 -100	4·0
"	"	2½-100	2½-100	2½-100	2½-100	4·5
" no spray						34·2
"	L.S.	1·008	1·008	1·008	1·008	3·0
Bridgetown		May 18	May 28	June 15	June 26	
Gravenstein	S.S.	1½-100	1½-100	1½-100	1½-100	34·4
" no spray						93·2
"	L.S.	1·008	1·008	1·008	1·008	36·0
King	S.S.	1½-100	1½-100	1½-100	1½-100	7·0
" no spray						57·18
"	L.S.	1·008	1·008	1·008	1·008	6·47
Stark	S.S.	1½-100	1½-100	1½-100	1½-100	4·07
" no spray						62·71
"	L.S.	1·008	1·008	1·008	1·008	8·62
Ben Davis	S.S.	1½-100	1½-100	1½-100	1½-100	2·37
" no spray						73·61
"	L.S.	1·008	1·008	1·008	1·008	8·07
Nonpareil	S.S.	1½-100	1½-100	1½-100	1½-100	2·34
" no spray						42·0
"	L.S.	1·008	1·008	1·008	1·008	3·44

SOLUBLE SULPHUR versus LIME-SULPHUR.

SUMMARY.

Number of Experiments.	——	Per cent Scab.
3	Soluble-sulphur 1½ lbs. to 100 gals....Falmouth	5·1
3	" 2 " 100 "	3·6
3	" 2½ " 100 "	3·3
2	Lime-sulphur 1·008 specific gravity	1·84
	Berwick.	
1	Soluble-sulphur 1½ lbs. to 100 gals	42·00
1	" 2½ " 100 "	36·70
1	Lime-sulphur 1·008 specific gravity	10·10
	Bridgetown.	
5	Soluble-sulphur 1½ lbs. to 100 gals	10·3
5	Lime-sulphur 1·008 specific gravity	12·52

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DIFFERENT QUANTITIES OF SOLUBLE SULPHUR.

In order to find out whether a strength of soluble sulphur greater than that advised, which is 1½ pounds to 100 gallons, will give a better control of scab, or increase the foliage injury, a series of tests were made at Berwick on Gravenstein, and at Falmouth on Gravenstein, Spy and Golden Russet. Five pounds of arsenate of lead was used per 100 gallons in each spray. The sprays were applied at the same date under uniform conditions.

It will be noticed that the fungicidal value of the spray was not materially increased by a strength greater than that recommended and that the stronger sprays are likely to cause increased foliage injury.

Spray used at Berwick on Gravenstein.	Per cent Scab.
Soluble sulphur 1½ lbs., Barium chloride ½ lb. to 100 gals	47·6
" 2 " " ½ " 100 "	84·2
" 2½ " " ½ " 100 "	42·2
" 3 " " ½ " 100 "	49 2
No spray	73·4

Spray used at Falmouth.

Gravenstein	Soluble sulphur 1½ lbs. to 100 gals	6·4
Northern Spy	" 1½ " 100 "	0·0
Golden Russet	" 1½ " 100 "	8·9
	Average of three varieties	5·1
Gravenstein	Soluble sulphur 2 lbs. to 100 gals	4·7
Northern Spy	" 2 " 100 "	2·2
Golden Russet	" 2 " 100 "	4·0
	Average of three varieties	3·6
Gravenstein	Soluble sulphur 2½ lbs. to 100 gals	6·3
Northern Spy	" 2½ " 100 "	2·1
Golden Russet	" 2½ " 100 "	4·5
	Average of three varieties	4·3
Gravenstein	No spray	43·2
Northern Spy	"	51·4
Golden Russet	"	34·2
	Average of three varieties	42·9
Gravenstein	Soluble sulphur 1½ lbs., BaCL2 ½ lb. to 100 gals	8·9
Northern Spy	" 1½ " " ½ " 100 "	4·2
Golden Russet	" 1½ " " ½ " 100 "	7·8
	Average of three varieties	6·9
Gravenstein	Soluble sulphur 2 lbs., BaCL2 ½ lb. to 100 gals	4·7
Northern Spy	" 2 " " ½ " 100 "	4·2
Golden Russet	" 2 " " ½ " 100 "	9·2
	Average of three varieties	6·0
Gravenstein	Soluble sulphur 2½ lbs., BaCL2 ½ lb. to 100 gals	9·2
Northern Spy	" 2½ " " ½ " 100 "	4·5
Golden Russet	" 2½ " " ½ " 100 "	12·8
	Average of three varieties	8·8

EXPERIMENTS WITH BARIUM CHLORIDE ADDED TO SOLUBLE SULPHUR TO LESSEN FOLIAGE INJURY.

When the foliage injury resulting from the use of soluble sulphur in the orchard experiments in 1914 was reported to the agent for the soluble sulphur compound we were told that it had been used too strong. The directions given on the container were followed in our 1914 tests. These directions, I may say were considerably modified on containers of this product put out later. It was also suggested that barium chloride added to the soluble sulphur arsenate spray at the rate of one-half pound to 100 gallons would entirely eliminate the burning of the foliage. The

several tests conducted to determine the value of barium chloride would go to show that there is on the whole some slight advantage from its use, but that the advantage is more than offset by the added cost. It does not, by any means make soluble sulphur arsenate a safe spray. Barium chloride costs 50 cents per pound, and as chloride of lime gives better results and costs only 15 cents per pound it seems unnecessary to experiment further with this substance.

The injury caused by the soluble sulphur arsenate spray is evidently due to the combination formed when arsenate of lead is added to the soluble sulphur solution. This is shown in our tests conducted at Berwick and given further on under the heading "Dry and Paste Arsenate of Lead with Lime and Soluble Sulphur."

We are now advised that arsenate of lime when used with soluble sulphur in place of arsenate of lead gives a spray that causes little if any injury. We have not tried arsenate of lime, but judging from our results with chloride of lime, which no doubt produces a somewhat similar combination when added to the soluble sulphur arsenate of lead spray, it may prove to be a satisfactory poison.

Five pounds of arsenate of lead was used in these sprays and the quantity of soluble sulphur varied from 1½ pounds to 100 gallons to 2½ pounds to 100 gallons. The results at Bridgetown would show quite an advantage from the use of barium although it does not by any means eliminate the burning. Where the half-pound was used to the 1½ pounds of soluble sulphur, quite a gain is shown at Berwick, but that this quantity of barium chloride is of no value where the 2 or 2½ pounds of soluble sulphur is used to 100 gallons is shown by the Berwick and Falmouth experiments. The Falmouth tests show 25 per cent gain however from the Barium chloride added to the spray of 1½ pounds soluble sulphur to 100 gallons, over the plots on which barium chloride was not used, but there was considerable burning about equal to that of Berwick on the plots where the barium chloride was added.

Value of Barium Chloride to Lessen Foliage Injury.

Where Test Made and variety.		Per cent Scab.	Foliage Injury.
	Spray used four times to each plot.		
Berwick			
Gravenstein	Soluble sulphur 1½ lbs. Barium ½ lb. to 100 gals.	47·6	12·
"	Soluble sulphur 1½ lbs. to 100 gals.	42·	55·
"	Soluble sulphur 2½ lbs., Barium ½ lb. to 100 gals.	42·2	64·
"	Soluble sulphur 2½ lbs. to 100 gals.	36·7	60·6
Falmouth	No Spray	73·4	
Gravenstein	Soluble sulphur 1½ lbs. Barium ½ lb. to 100 gals	8·9	32·
Northern Spy	" 1½ " ½ " 100 "	4·2	26·
Golden Russet	" 1½ " ½ " 100 "	7·8	30·
	Average of three varieties	6·9	29·3
Gravenstein	Soluble sulphur 1½ lbs. to 100 gals.	6·4	37·
Northern Spy	" 1½ " 100 "	0·0	39·
Golden Russet	" 1½ " 100 "	8·9	39·
	Average of three varieties	5·06	35·
Gravenstein	Soluble sulphur 2 lbs. Barium ½ lb. to 100 gals.	4·7	41·
Northern Spy	" 2 " ½ " 100 "	4·2	43·
Golden Russet	" 2 " ½ " 100 "	9·2	36·
	Average of three varieties	6·03	40·
Gravenstein	Soluble sulphur 2 lbs. to 100 gals.	4·7	48·
Northern Spy	" 2 " 100 "	2·2	47·
Golden Russet	" 2 " 100 "	4·0	40·
	Average of three varieties	3·6	45·
Gravenstein	Soluble sulphur 2½ lbs. Barium ½ lb. to 100 gals.	9·2	45·
Northern Spy	" 2½ " ½ " 100 "	4·5	44·
Golden Russet	" 2½ " ½ " 100 "	12·8	30·
	Average of three varieties	8·8	39·7
Gravenstein	Soluble sulphur 2½ lbs. to 100 gals.	6·3	46·
Northern Spy	" 2½ " 100 "	2·1	41·
Golden Russet	" 2½ " 100 "	4·5	34·
	Average of three varieties	4·3	40·3
Gravenstein	No spray	43·2	
Northern Spy	"	51·4	
Golden Russet	"	34·2	
	Average of three varieties	42·9	
Bridgetown			
Gravenstein	Soluble sulphur 1½ lbs. Barium ½ lb. to 100 gals.	21·4	16·
Tompkins King	" 1½ " ½ " 100 "	4·41	5·
Stark	" 1½ " ½ " 100 "	9·13	5·
Ben Davis	" 1½ " ½ " 100 "	9·16	8·
Roxbury Russet (Nonpareil)	" 1½ " ½ " 100 "	3·22	2·
	Average of five varieties	9·46	5·6
Gravenstein	Soluble Sulphur 1½ lbs. to 100 gals.	34·4	27·
Tompkins King	" 1½ " 100 "	7·	16·
Stark	" 1½ " 100 "	4·7	26·
Ben Davis	" 1½ " 100 "	2·37	18·
Roxbury Russet (Nonpareil)	" 1½ " 100 "	2·34	22·
	Average of five varieties	10·16	17·

Barium Chloride to Lessen Foliage Injury.

Summary.

	Per cent of foliage injury.		
	Berwick.	Bridgetown.	Falmouth.
1½ pounds Soluble sulphur, 5 pounds Arsenate of lead and half pound Barium chloride	12	7·	29·3
1½ pounds Soluble sulphur, 5 pounds Arsenate of lead and no Barium chloride	55	21·8	35·
2 pounds Soluble sulphur, 5 pounds Arsenate of lead and ½ pound Barium chloride			40·
2 pounds Soluble sulphur, 5 pounds Arsenate of lead and no Barium chloride			45·
2½ pounds Soluble sulphur, 5 pounds Arsenate of lead and half pound Barium chloride			39·7
2½ pounds Soluble sulphur, 5 pounds Arsenate and no Barium chloride			40·3

Soluble sulphur Arsenate and Barium chloride at Different strengths for scab Control.

Summary.

	Per cent. Scab.		
	Berwick	Falmouth.	Bridgetown.
Soluble sulphur 1½ pounds, Barium chloride half pound	47·6	6·9	9·46
" 1½ " No Barium chloride	42·	5·6	10·16
" 2 " Barium chloride half pound		6·03	
" 2 " No Barium chloride		3·6	
" 2½ " Barium chloride half pound	42·2	8·8	
" 2½ " No Barium chloride	36·7	4·3	
No spray	73·4	42·9	

FOLIAGE INJURY FROM THE SOLUBLE SULPHUR SPRAYS.

In order to find out when the most injury to foliage is likely to take place a close record was kept of the injury resulting from the different sprays. The following table gives the average of twenty experiments conducted at Berwick. It will be seen that the injury to the Gravenstein was about the same from the first, third and fourth spray, and on the King block the greatest injury was done by the first spray. The second spray gave very little injury.

A study of meteorological observations would go to show that the greatest injury took place when rainy weather occurred on the days following the application and that when bright days followed the application as was the case for the week following the spray put on May 31, no injury resulted.

Time of Foliage Injury.

	Average per cent of Injury.			
	1st. Spray.	2nd. Spray.	3rd. Spray.	4th. Spray.
Gravenstein at Berwick	9·06	0·5	9·2	7·15
Tompkins King at Berwick	23·1	0·0	6·4	0·0

SOLUBLE SULPHUR ARSENATE AND BARIUM CHLORIDE VERSUS LIME-SULPHUR-ARSENATE FOR SCAB CONTROL.

A series of tests was conducted with soluble sulphur 1½ pounds, arsenate of lead, 5 pounds and Barium chloride ½ pound to 100 gallons as compared with the regular lime-sulphur-arsenate of 1·008 sp. gr. or 1 gallon of Grasselli concentrate lime-sulphur

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which tested 1·30 sp. gr. to 36 gallons water to which was added 5 pounds arsenate of lead to 100 gallons.

An average of the results as given in the summary shows that soluble sulphur arsenate with barium chloride at Berwick and Falmouth did not control scab as well as the lime-sulphur-arsenate, while at Bridgetown the reverse is shown.

Soluble Sulphur and Barium Chloride vs. Lime-sulphur.

Where test made and variety.	Spray used four times on each plot.	Per cent Scab.
Berwick		
Gravenstein	Soluble sulphur 1½ lbs. Barium ½ lb. to 100 gals	31·5
Ben Davis	" 1½ " ½ " 100 "	10·2
Blenheim	" 1½ " ½ " 100 "	·6
Twenty Ounce	" 1½ " ½ " 100 "	5·4
Tompkins King	" 1½ " ½ " 100 "	8·8
Ribston	" 1½ " ¼ " 100 "	13·1
Gravenstein	" 1½ " ½ " 100 "	47·6
Tompkins King	" 1½ " ½ " 100 "	18·0
	Average of eight varities	16·9
Gravenstein	Lime-sulphur 1·008 sp. gr., or 1 to 37 gals	16·8
Ben Davis	" 1,008 " 1 " 37 "	3·1
Blenheim	" 1·008 " 1 " 37 "	0·0
Twenty Ounce	" 1·008 " 1 " 37 "	0·6
Tompkins King	" 1·008 " 1 " 37 "	10·9
Ribston	" 1·008 " 1 " 37 "	1·9
Gravenstein	" 1·008 " 1 " 37 "	10·1
Tompkins King	" 1·008 " 1 " 37 "	7·7
	Average of eight varieties	6·4
Gravenstein	No Spray	91·
Ben Davis	"	75·3
Gravenstein	"	87·4
Tompkins King	"	82·5
	Average of four varieties	84·
Bridgetown		
Gravenstein	Soluble sulphur ½ lb., Barium ½ lb. to 100 gals	21·4
Ben Davis	" ½ " ½ " 100 "	9·16
Tompkins King	" ½ " ¾ " 100 "	4·41
Stark	" ½ " ½ " 100 "	9·13
Roxbury Russet (Nonpareil)	" ½ " ½ " 100 "	3·22
	Average of five varieties	9·46
Gravenstein	Lime-sulphur 1·008 sp. gr., or 1 to 37 gals	36·
Ben Davis	" 1·008 " 1 " 37 "	8·7
Tompkins King	" 1·008 " 1 " 37 "	6·47
Stark	" 1·008 " 1 " 37 "	8·62
Roxbury Russet (Nonpareil)	" 1·008 " 1 " 37 "	3·44
	Average of five varieties	12·64
Gravenstein	No spray	93·2
Ben Davis	"	73·6
Tompkins King	"	57·18
Stark	"	57·71
Roxbury Russet (Nonpareil)	"	42·00
	Average of five varieties	65·74
Falmouth		
Northern Spy	Soluble sulphur 1½ lbs. Barium ½ to 100 gals	4·2
Golden Russet	" 1½ " ½ " 100 "	7·8
	Average of two varieties	6·
Northern Spy	Lime-sulphur 1·008 sp. gr., or 1 to 37 gals	·67
Golden Russet	" 1·008 " 1 " 37 "	3·00
	Average of two varieties	1·83
Northern Spy	No Spray	51·4
Golden Russet	"	34·2
	Average of two varieties	42·8

SUMMARY.

Number of Tests.	Where test made.	Per cent. Scab.		
		Soluble Sulphur Arsenate and Barium chloride.	Lime Sulphur Arsenate	No. Spray.
8	Berwick..	16·9	6·4	84·
5	Bridgetown..	9·46	12·64	65·74
2	Falmouth....	6·0	1·83	42·8

CALCIUM CHLORIDE ADDED TO SOLUBLE SULPHUR TO PREVENT FOLIAGE INJURY.

For the purpose of comparing the value of calcium chloride (chloride of lime) with barium chloride as a substance suitable for use in a soluble sulphur arsenate spray mixture, to prevent burning of the foliage caused by the combination formed when arsenate of lead is mixed with soluble sulphur, tests similar to these with barium chloride were made only in a much more limited way. The tests were made at Berwick, using three King trees of uniform size to each plot and each were sprayed four times in the same way on the same dates. The plots were carefully examined after each application and the only injury detected was that shown on the plot where one-half pound was used.

This injury was confined entirely to the first spray and no injury could be detected from later sprays. The other plots were entirely free from foliage injury. It would appear that calcium chloride is much more valuable than barium chloride for overcoming soluble sulphur arsenate injury to foliage. Calcium chloride has a commercial value of from 10 to 15 cents per pound. It is a powder and is added to the soluble sulphur arsenate spray in this form. One and one-half pounds of soluble sulphur and 5 pounds Swifts arsenate of lead was used to each 100 gallons of water and to this the various amounts of calcium and barium chloride were added.

Spray used.	Per cent. Scab.	Per cent Foliage Injury.
Soluble Sulphur 1½ pounds, Calcium Chloride ½ pound to 100 gallons.	33·8	20·
" " 2½ " " " ¾ " " 100 "	28·6	0·
" " 1½ " " " 1 " " 100 "	21·2	0·
" " 1½ Barium Chloride ½ " " 100 "	31·3	38·
" " 1½ " " " ¾ " " 100 "	26·6	38·
" " 1½ " " " 1 " " 100 "	17·0	40·
No Spray	92·8	

SOLUBLE SULPHUR WITH AND WITHOUT ARSENATE OF LEAD.

In order to find out whether soluble sulphur alone would cause injury to foliage tests were conducted on Gravenstein trees at Berwick. Three trees were used to each test and the material was applied at the same dates under uniform conditions. Duplicate tests on adjoining plots of the same variety were made with Swifts arsenate of lead paste added to the soluble sulphur at the rate of 5 pounds per 100 gallons. It will be noticed that a slight injury was detected on the plot where 2½ pounds was used to 100 gallons without the arsenate. This injury was confined to the third spray June 14, and was the only injury noticed. It will be seen, therefore, that the injury

is due to the arsenate of lead when combined with soluble sulphur. It will be noticed also that the control of scab was not nearly so good on the plots where no arsenate of lead was used, which may be due to the soluble sulphur arsenate being more adhesive than soluble sulphur spray.

Spray used.	Per cent. Scab.	Per cent. Foliage Injury.
Soluble Sulphur 1½ pounds to 100 gallons no arsenate	74·9	0·
" " 2½ " " 100 " " "	81·3	slight.
" " 1½ " " 100 " 5 pounds arsenate of lead	42·	55·
" " 2½ " " 100 " 5 " " " "	36·7	30·6
No Spray	87·4	

LIME-SULPHUR WITH AND WITHOUT ARSENATE OF LEAD.

Tests were made at Bridgetown and Berwick to test out the value of arsenate of lead when added to lime-sulphur as compared with lime-sulphur without arsenate for scab control. The results would seem to show that arsenate of lead does not materially increase the fungicidal value of lime-sulphur. Arsenate of lead, however, has some fungicidal value when used alone, but the low per cent of scab on the Baldwin block at Bridgetown where arsenate of lead was used alone cannot be entirely due to the arsenate, although we cannot otherwise account for the difference.

——	King Apples at Bridgetown.	Per cent. Scab.
Lime Sulphur	1·008, Grasselli arsenate paste 5 pounds to 100 gallons	3·9
" "	1·008, no arsenate	9·48
No Lime sulphur	Grasselli arsenate paste 5 pounds to 100 gallons	21·35
No spray		72·86
	Baldwin at Bridgetown.	
Lime Sulphur	1·008, Grasselli arsenate paste 5 pounds to 100 gallons	1·04
" "	1·008, no arsenate	2·64
No Lime Sulphur	Grasselli arsenate paste 5 pounds to 100 gallons	1·34
No Spray		90·01
	Baldwin at Berwick.	
Lime Sulphur	1·008, Swifts arsenate paste 5 pounds to 100 gallons	2·8
" "	1·008, no arsenate	1·5
No Spray		78·0
	Ben Davis at Berwick.	
Lime Sulphur	1·008, Swifts arsenate paste 5 pounds to 100 gallons	4·5
" "	1·008, no arsenate	7·9
No Lime Sulphur	Swifts arsenate paste 5 pounds to 100 gallons	51·3
No Spray		75·3

BORDEAUX MIXTURE VERSUS LIME-SULPHUR.

Experiments were conducted at Berwick with Bordeaux and lime-sulphur as a spray for the control of scab. The plots were sprayed under similar conditions and were uniform. The results obtained were similar to those of previous years, and show that Bordeaux is equally as effective in scab control as lime-sulphur, but that the russeting reduces materially the quantity of No. 1 and No. 2 fruit, as shown in the packed out results, making Bordeaux quite unsatisfactory other than for scab control.

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It will be noticed that injury to foliage resulted in the Bordeaux-lime-sulphur plot where the regular 4-4-40 (4 pounds bluestone, 4 pounds lime, 40 gallons water) strength was used, whereas where the 3-3-40 (3 pounds bluestone, 3 pounds lime, 40 gallons water) strength was used no injury was noticeable. This injury occurred after the lime-sulphur spray June 15 was applied. It would seem that the 3-3-40 Bordeaux for the first sprays followed by lime-sulphur will give satisfactory results.

Place Where Test made and Variety.	Time of Application.				Per cent. Foliage Injury.	Per Scab.	Per cent. Russet Injury.	Packed out 1 and 2.
	May 18	June 2	June 15	July 2				
Baldwin	4-4-40	4-4-40	4-4-40	4-4-40	0·	·07	42·1	38·8
"	3-3-40	3-3-40	3-3-40	3-3-40	0	·06	65·4	19·1
"	4-4-40	4-4-40	1·008	1·008	20·	·02	0·0	94·3
"	3-3-40	3-3-40	1·008	1·008	0	·04	0·0	89·9
"	1·008	1·008	1·008	1·008	.....	1·6	0·0	87·5
"	No Spray				.....	.....	.....	3·

STRENGTH OF LIME-SULPHUR TO USE.

Experiments were continued again this season to find out what strength of lime-sulphur gives best scab control. The test was conducted on a Spy block of uniform trees. It would appear from the results that the various strengths used were equally effective. Five pounds of arsenate of lead was used to each 100 gallons. The Grasselli concentrated lime-sulphur was used which tested 1·300 specific gravity. The strength of the different sprays used were as follows:

1·014 specific gravity test=1 gallon Concentrate to make 21 3-7 gallons.
1·009 " " " =1 " " " " 33 1-3 "
1·008 " " " =1 " " " " 37·5 "
1·007 " " " =1 " " " " 42 6-7 "

Where Test Made and Variety.	Time of Application.				Per cent. Scab.
Berwick.	May 19	June 8	June 18	July 1	
Spy	1·008	1·008	1·008	1·008	3·14
"	1·007	1·007	1·007	1·007	2·4
"	1·007	1·008	1·008	1·008	4·29
"	1·009	1·008	1·008	1·008	3·55
"	1·014	1·008	1·008	1·008	3·6
" No spray	.....				95·2

LIME-SULPHUR AND PARIS GREEN.

One plot of Kings at Berwick containing three trees, was sprayed four times with lime-sulphur, sp. gr. 1·008 with 1½ pounds of Paris green per 100 gallons. These trees were sprayed on the same dates as the other King plots. The hand pump being used at a pressure of 140 pounds. The amount of bloom was the same on these as adjoining trees, but not only was the foliage badly injured and the trees practically defoliated but the fruit clusters were so damaged that all the fruit dropped soon after blossoming and not a single fruit developed. This experiment would show that Paris green cannot be used in the lime-sulphur spray without causing very great injury to foliage and possibly of an entire crop of fruit.

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DRY AND PASTE ARSENATE OF LEAD WITH LIME AND SOLUBLE SULPHUR.

The sprays as given in the following table were all applied under similar conditions in each place and in a uniform manner. Three trees were included in each plot. The trees were as uniform as could be obtained. As the trees were of even size practically the same amount of liquid was used to each plot averaging 15 gallons to 3 trees. The mixture was kept thoroughly agitated and the work carefully done in order to avoid any possible error due to method of application.

All the sprays in the tests on the Baldwin trees were put on May 18, June 3, June 15, and July 2. The foliage injury given below on these trees was confined entirely to the fourth spray. It will be noticed, also, that the control of scab was apparently as good in the plot without arsenate as where arsenate of lead was used in the spray.

The varieties of King and Baldwin were used at Bridgetown in this test and the results would seem to show that arsenate of lead when added to the lime-sulphur adds very little to its fungicidal value. We cannot explain why control of scab should be so great on the plot of Baldwin trees where arsenate of lead only was used.

It will be seen that the foliage injury is much greater on the soluble sulphur plots than on the lime-sulphur plots with the same amount of arsenate of lead. It would appear that the increase of arsenate of lead in the soluble sulphur did not materially increase the total foliage injury at Bridgetown, but at Berwick where the arsenate was left out of the first spray there was no injury. It will be noticed also that there was no apparent injury from the second spray May 31, at Berwick and that the foliage injury was confined principally to the two sprays after blossoming. The plots on which no arsenate of lead was used in the first spray did not show as good scab control as the duplicate plots where it was used and the plots sprayed with soluble sulphur only would show that arsenate of lead very materially increases the fungicidal value of soluble sulphur.

It should be noted that the insect injury recorded is that apparent from an examination of the fruit at picking time and does not include any foliage or other injury up to that time. This orchard has in the past always been well sprayed and the insect pests have, as a result, been kept well under control, which no doubt accounts for the small per cent of insect injury.

TOMPKINS KING APPLE, BERWICK.

Soluble Sulphur used in four Sprays.	Per cent. Foliage Injury.	Per cent. Scab.	Per cent. Insect Injury.
S–S. 1½ pounds to 100 gallons Dry arsenate 2 pounds to 100 gallons	30·	10·4	1·3
" 1½ " " 100 " " " " 4 " " 100 "	35·	17·4	0·0
" 1½ " " 100 " Swifts arsenate paste 5 pounds to 100 gallons..	65·	18·0	0·0
" 1½ " " 100 " Swifts arsenate paste 7 pounds to 100 gallons..	38·	31·3	2·3
No Spray	0·	82·5	7·
L–S 1·008, Swifts arsenate paste 5 pounds to 100 gallons...	.....	7·7	·3

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GRAVENSTEIN APPLE AT BERWICK.

Soluble Sulphur used in four Sprays.	Per cent. Scab.	Per cent. Foliage injury		Per cent. Insect Injury.
		1st, 3rd and 4th.		
	Spray.	Spray.		
S–S. 1½ pounds to 100 gallons Swifts arsenate in three last sprays	52·	0·0	40·0	0·0
" 2½ " " 100 " Swifts arsenate in three last sprays	68·7	0·0	30·0	0·0
" 1½ " " 100 " Swifts arsenate in all four sprays	42·	15·	40·0	0·6
" 2½ " " 100 " Swifts arsenate in all four sprays	36·7	20·6	30·0	2·0
" 1½ " " 100 " no arsenate	74·9	0·0	0·0	1·0
" 2½ " " 100 " " "	81·3	·00	0·5	·8
No Spray	87·4	0·0	0·0	5·3

BALDWIN APPLE, BERWICK.

Lime-Sulphur used in four Sprays.	Per cent. Foliage Injury.	Per cent. Scab.	Per cent. Insect. Injury.
L–S 1·008, Dry arsenate 2 pounds to 100 gallons	5·	7·3	0·0
" 1·008, " " 4 " " 100 "	7·	0·0	1·5
" 1·008, Swifts arsenate paste 5 pounds to 100 gallons	2·5	2·8	·35
" 1·008, " " " 7 " " 100 "	4·	1·0	0·0
No Sprays	0·	78·	2·7
L–S 1·008, Swifts arsenate paste 5 pounds to 100 gallons 1st, 2nd and 3rd sprays only	0·	5·7	1·1
" 1·008, Swifts arsenate paste 5 pounds to 100 gallons in 2nd and 3rd sprays only		1·5	1·1
" 1·008, Swifts arsenate paste 5 pounds to 100 gallons 3rd spray only		1·8	1·4
" 1·008, no arsenate used	3·	1·5	2·2

TOMPKINS KING APPLE, BRIDGETOWN.

L–S 1·008, Grasselli arsenate paste 5 pounds to 100 gallons		3·9	4·
" 1·008, Dry Arsenate 2 pounds to 100 galloas		10·67	2·
" 1·008 " " 4 " " 100 "	3·	4·74	5·
" 1·008, no arsenate		9·48	7·
No L–S. Grasselli arseaate paste 5 pounds to 100 gallons	4·	21·35	17·
Not Sprayed		72·86	24·

BALDWIN APPLE, BRIDGETOWN.

L–S1·008, Grasselli arsenate paste 5 pounds to 100 gallons	4·	1·94	1·
" 1·008, Dry arseaate 2 pounds to 100 gallons	4·	1·33	9·
" 1·008 " " 4 " " 100 "	4·	1·04	6·
" 1·008,no arsenate		2·68	7·
No. L–S. Grasselli arsenate paste 5 pounds to 100 gallons		1·34	5·
Not Sprayed		90·01	19·

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DRY AND PASTE ARSENATE OF LEAD WITH LIME AND SOLUBLE SULPHUR.

Number of Experiments.	Summary.	Foliage Injury.	Insect Injury.	Per cent. Scab.
1-Soluble sulphur....	1½ pounds 2 pounds dry lead per 100 gallons....	30·	1·3	10·4
1- " " ...	1½ " 4 " " " " 100 " .	35·	0·0	17·4
2- " "	1½ " 5 " paste " " 100 " .	60·	0·3	30·0
1- " "	1½ " 7 " " " " 100 " .	38·	2·3	31·3
1- " "	1½ " no arsenate....	.....	1·	74·9
3-Lime sulphur.....	1·008, 2 pounds dry lead per 100 gallons.....	1·5	3·7	6·2
3- " " ...	1·008, 4 " " " " 100 "	4·6	4 2	1·75
1- " "	1·008, 5 " paste " " 100 "	2·5	·35	2·8
1- " "	1·008, 7 " " " " 100 "	4·	0·	1 0
1- " "	1·008, no arsenate.....	3·	2·2	1·5

In general we are safe in drawing the following conclusions:—

1. The spray before the leaves open is not likely to give results sufficiently great to pay for its application.

2. Two foliage applications before blossoming are desirable and that more care should be given to thoroughly protect the foliage up to this time.

3. Two thorough sprays before blossoming followed by two after will give practically clean fruit.

4. The 1·008 specific gravity test strength of lime-sulphur is sufficiently strong to control scab and that a greater strength is a waste and may cause foliage injury and possibly a loss of fruit from burning.

5. Any of the well-established brands of arsenate of lead seems to give equally as good results when used in lime-sulphur.

6. Lime-sulphur alone is nearly as good a fungicide as lime-sulphur-arsenate.

7. Owing to insect injury the arsenate cannot be safely omitted from the spray.

8. Lime-sulphur is equally as good as Bordeaux for scab control.

9. The greatest objection to Bordeaux is the russeting of the fruit, which if bad will reduce the grade.

10. The home-made concentrated is as effective for scab control if used at the same specific gravity test as the commercial concentrated.

11. In all tests with soluble sulphur-arsenate the scab control has not been as good as with lime-sulphur arsenate.

12. Soluble sulphur-arsenate is liable to cause serious foliage injury.

13. Soluble sulphur alone without arsenate of lead is not so good a fungicide evidently due to the arsenate rendering it more adhesive.

14. Barium chloride is of no practical value for lessening foliage injury when added to soluble sulphur-arsenate.

15. A strength of soluble sulphur 1½ pounds to 100 gallons is apparently about as good a fungicide as that of a greater strength and the stronger spray is liable to cause more injury.

16. Owing to the injury liable to result we consider lime-sulphur-arsenate preferable to soluble sulphur-arsenate.

ORCHARD HEATING.

Nearly all fruit growing sections from time to time suffer some loss from spring frosts killing the fruit during the blossoming period. Such frosts are usually of short duration, and generally are confined to one night but damage may result from a low temperature of only a few hours during the early morning

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It has been found practical in frnit growing sections outside of Nova Scotia to use orchard heaters to keep the temperature above freezing during such a period, accordingly a test was made at Berwick during the spring of 1915, to find out whether such heaters could be used economically here. The temperature however did not go low enough to do damage and the experiment was of no value in estimating definitely the advantage from such a practice, although our results show that frosts can be warded off by such means.

The orchard used was one owned by Mr. Fred Parker, located on a rather low piece of land at Berwick. The trees were planted 20 feet apart each way. Thermometers were placed at the northern edge of the orchard and toward the centre. They were placed one on the ground, one 10 feet from the ground, and another 20 feet from the ground. The top thermometers did not register frost whereas the others went below frost, the one at the ground being the lowest. The average being 30·2° F. when the fires were started. The heaters used were made out of ordinary sheet-iron or stove-piping. They are cylindrical in shape and hold about two gallons. One of these cans was placed in the centre of each four trees and as far away from the trees as possible to prevent burning of the leaves or branches, 108 being nsed per acre. They were filled two-thirds full of crude petroleum and covered with a sheet-iron cover.

During the morning of the 2nd of June the temperature dropped to 30·2° F. The blossom buds were then just unfolding and not advanced enough to be injured by so slight a frost. Nevertheless, the heaters in every alternate row of trees were fired at 2.30 a.m. This was done by going from can to can removing cover, applying a few drops of gasolene to the crude oil and igniting with a torch. The crude oil is hard to ignite when cold, and to save time and labour the gasolene was used as a starter. The temperatures were taken half an hour after the stoves had been lighted and they averaged 35 degrees. Thus fifty-four heaters per acre were sufficient to keep the temperature above the freezing point, and in one-half hour after lighting the temperature went up nearly 5 degrees.

After all danger of frost was over the fires were extinguished by simply placing the covers on the cans. The heaters were burning two hours and consumed one-half gallon of oil each. The following would be approximately the cost of heating one acre of orchard of medium sized trees:—

54 heaters at 10 cents each	$5 40
27 gallons oil at 10 cents per gallon	2 70
Labour of filling, lighting, etc	0 50
Total	$8 60

Of course the initial expense would be the greatest, but after the heaters were obtained all the expense would be that for oil and labour. The expense of the oil would vary according to length of time the heaters were burning.

EXPERIMENTAL STATION, FREDERICTON, N.B.

REPORT OF THE SUPERINTENDENT, W. W. HUBBARD.

THE SEASON.

The winter was, in the early part, clear and cold with scarcely any snow. In the latter part of December, 1914, it was intensely cold, the frost penetrating the bare ground to a greater depth than usual. January, February, and March, 1915, were much milder than the average, the mean temperature for these months being 22·8 degrees Fahr., against an average for forty-two years of 18 degrees, but with less sunshine and only about half the usual precipitation. There was scarcely any snow-covering on the fields at any time and the ground was practically bare after the 9th of March. April was, however, wet with only 102 hours of bright sunshine, while in May there were sixteen, and in June twenty wet days. July had only fourteen days rainy but during one of them there was a precipitation of 3·26 inches, which left the already saturated ground standing in pools of water, and drowned out much crop. August had thirteen days on which rain fell and up to September first the temperature was abnormally low. From May 1 to September 1 there was a rainfall of 19 inches compared with an average for these months, for forty-one years, of 14⅓ inches. These unusual weather conditions greatly hindered all agricultural operations and in some low-lying districts were entirely prevented.

No frost was recorded at this Station after May 1, though the nights were cool all through the summer. The first frost occurred on September 26, but was only noticeable in low places. Potatoes, corn, etc., were partially killed on October 2, but not generally until the 11th of that month.

The same amount of land as last year, viz., 17 acres, exclusive of potatoes, was devoted to horticultural work, and in addition, 6 acres more were broken up out of sod and cleared from stumps for lawn purposes. This latter portion will be worked level, roads constructed through it and seeded in 1916. The perennial border on the southeast side of the vegetable plots was widened and 119 varieties of perennials were planted in the fall. A lawn 12 feet wide and 600 feet long was sown between the perennial border and road. A second perennial border, 400 feet in length, was established and plantings of willow, spruce, and pine made in the shelter belt to the northwest of the garden. Twenty-seven species of hedge shrubs and trees were planted, some of them in rows 33 feet long and some in rows 66 feet. The hedge rows were placed 15 feet apart.

All varieties of strawberries that did not grow in 1914, and come through the winter, were reset.

Varietal tests were made with all garden vegetables and the fertilizer test begun in 1914 was continued. In this, the experience of the previous year was confirmed in finding that 15 tons of barnyard manure per acre, valued at $15, with from $5 to $10 worth of chemical fertilizers, gave generally much larger yields than where 30 tons of manure per acre, valued at $30, was applied.

Of the one hundred and fifty-two varieties of potatoes grown in 1914, thirty-two were discarded in 1915 as being either undesirable or duplicates of other varieties, and one hundred and twenty varieties were grown. A great difference in the disease resistent qualities of different varieties was noted. While the ground on which the variety rows were planted was fairly uniform in regard to drainage, some rows

suffered more than others from wet and yields recorded might have been different under absolutely fair soil conditions. A test of the value of hill selection was attempted with twenty varieties, but the wet weather and uneven ground surface, causing the drowning out of irregular portions of the test rows, prevented the obtaining of any conclusions from this test.

Work done by the Division of Botany in the study of potato diseases was carried on in connection with the general potato crops of this Station and an isolated four acres of land was set apart for special investigational work with powdery scab, club root, etc.

ORCHARD.

In the apple orchard one hundred and sixty trees, out of the eight hundred planted, were killed, mostly by root freezing. The absence of snow and severe cold winds in the more exposed portions of the orchard were the evident cause, as in comparatively sheltered positions the trees came through without loss.

SMALL FRUITS.

The bush fruits planted out in the spring of 1914 came through the winter in good shape with the exception of the blackberries, which died out. All varieties fruited well but the depredations of birds and children prevented the collection of any reliable data. A list of varieties is given below:—

Black Currants.

Black Champion.	Boskoop Giant.	Buddenborg.	Climax.
Clipper.	Collins Prolific.	Eagle.	Eclipse.
Kerry.	Lee Prolific.	Magnus.	Saunders.
Topsy.	Victoria.		

Red Currants.

Admirable.	Chautauqua.	Cherry.	Cumberland.
Diploma.	Fay Prolific.	Greenfield.	Perfection.
Rankins Red.	Red Cross.	Red Dutch.	Red Grape.
Victoria Red.	Wilder.		

White Currants.

Large White.	White Cherry.	White Grape.

Gooseberries.

Crown Bob.	Downing.	Pearl.	Whinham Industry.

Raspberries.

Brighton.	Columbian.	Count.	Golden Queen.
Herbert.	King.	Marlboro.	Older.
Ruby.	Sarah.	Shaffers.	

STRAWBERRIES.

Thirty-three varieties of strawberries were planted on May 15 to replace those which died out through being badly packed by the shippers. None of the plants were allowed to blossom and all superfluous runners were taken off. Following is a list of the varieties grown:—

Abington P.
Beder Wood P.
Brandy Wine P.
Bubach I.
Cassandra P.
Chesapeake P.
Clyde P.
Cordelia P.
Desdemona I.
Enhance P.
Excelsior I.
Gandy P.
Haverland I.
Howard P.
Julia P.
Lovett P.
Mariana P.
Meteor I.
Ophelia P.
Parsons Beauty P.
Pocomoke P.
Portia I.
President I.
Sample I.
Senator Dunlap P.
Splendid P.
Tennessee P.
Valeria P.
Virgilia P.
Warfield I.
Wildwood.
Williams P.
Wm. Belt P.

VEGETABLES.

All vegetables did well with the exception of beans, which were badly attacked by anthracnose. Very little trouble from insect pests was experienced and altogether the season may be considered a fairly good one from a vegetable growing point of view.

The following tables give further details of the various vegetables grown.

BEANS.

Ten strains or varieties were tested, but as all varieties were so badly attacked by anthracnose no data were taken.

BEETS.

Six varieties of beets were grown and produced a good crop of shapely roots.

	Yield per acre.		Quality.
	tons	lb.	
Crosby Egyptian	8	1380	Good.
Ruby Dulcet	8	720	Excellent.
Eclipse	8	60	Very good.
New Meteor	6	1860	Excellent.
Rennie Cardinal Globe	6	1420	Good.
New Early Black Red Ball	6	1200	Medium.

BRUSSELS SPROUTS

Dwarf Improved was the variety grown and yielded a good crop of solid sprouts.

CABBAGE.

Eight varieties of cabbage were under test, each variety gave good results. They are listed below in order of maturity, the last three being ready at the same time. Copenhagen Market is very little later than Early Jersey Wakefield and produces much better heads.

Paris Market.
Early Jersey Wakefield.
Copenhagen Market.
Danish Summer Ballhead.
Fottler Improved Brunswick.
Flat Swedish.
Extra Amager Danish Roundhead.
Improved Amager Danish Roundhead.

CARROTS.

Four varieties of carrots were grown, the half long type being the most desirable.

	Yield per acre. tons.	lb
Half Long Chantenay	18	1,224
Improved Nantes	16	208
Improved Danvers Half Long	14	1,568
Early Scarlet Horn	11	968

CAULIFLOWER.

Cauliflowers have been uniformly good for the past three years. This season a few heads were attacked by soft rot. The following three varieties were grown, Early snowball, Extra Selected Early Dwarf Erfurt and Danish Giant Dryweather.

CELERY.

Seven varieties of celery were under test and the following tables show the results obtained.

	Yield per acre tons.	lb.
Giant Pascal	34	1,520
Winter Queen	21	240
Evans Triumph	20	1,800
Noll Magnificent	19	1,600
Paris Golden Yellow	19	280
White Plume	18	960
French Success	16	120

CORN.

Fifteen varieties of corn were tested, ten hills of each variety were planted, 3 feet apart each way.

	No. of cobs produced from ten hills.
Early Dawn	68
Metropolitan Sweet	60
Astor	58
Golden Bantam	47
Early Iowa	45
Ex. Early Adams	43
Pocahontas Sweet	41
Stowell Evergreen	41
Perkins Extra Early Market	39
Early Malakoff	38
Early Fordhook	38
Early Malcolm	33
Early Evergreen	29
Country Gentleman	14
Black Mexican	Failed to mature.

FREDERICTON.

CUCUMBERS.

Six varieties of cucumbers were grown and gave a fairly good crop, Improved White Spine and Davis Perfect being the most desirable varieties.

Davis Perfect.
Extra Early Russian.
Fordhook Famous.
Giant Pera.
Peerless or Improved White Spine.
Prize Pickle.

LEEK.

Two varieties were tested, viz., English Flag and French Cerantan, both produced good crops.

LETTUCE.

Seven varieties were grown, the most satisfactory being Grand Rapids and Dreer All Heart.

Cos Trianon.
Dreer All Heart.
Giant Crystal Head.
Grand Rapids.
Hanson Improved.
Iceberg.
Simpson Black-seeded.

MELONS.

Five varieties of muskmelons and four varieties of watermelons were grown but failed to produce anything worth while.

ONIONS.

Eleven strains or varieties of onions were grown. The following table shows the yield per acre of each variety calculated from rows 33 feet long and 1 foot apart. The seed was sown May 24 and the crop harvested September 18.

	Yield per acre.	
	tons	lb.
Danvers Yellow Globe (from sets)	26	1460
Danvers Yellow Globe (from seed)	26	665
Large Red Wethersfield (from sets)	23	530
Yellow Globe (from seed)	21	240
Yellow Onions (from sets)	19	610
Red Globe (from seed)	15	680
White Globe (")	14	1040
Salzer Giant Red Wethersfield (")	13	1720
Johnson Dark Red Beauty (")	12	1740
Large Red Wethersfield (")	10	1120
Ailsa Craig (")	7	1840

PARSNIP.

Two varieties were grown and produced good crops of shapely roots.

	Yield per acre.	
	Bush.	lb.
Improved Hollow Crown	561	20
Intermediate	475	8

FREDERICTON.

PEAS.

Fifteen varieties of peas were sown May 25. All varieties made good growth and produced fair average crops.

Variety.	Length of row.	Ready for use.	Yield.	
			lb.	oz.
Heroine	33	Aug. 7	36	
Quite Content	33	" 7	34	
Early Giant	33	" 1	30	9
Advancer	33	" 1	30	8
Telephone	33	" 18	30	
Thomas Laxton	33	July 22	26	4
Gradus	33	Aug. 7	25	3
Sutton Excelsior	33	" 7	24	14
Juno	33	" 11	24	12
The Lincoln	33	" 14	24	8
Gregory Surprise	33	" 7	23	4
Stratagem	33	" 7	22	8
American Wonder	33	July 29	16	15
Premium Gem	33	Aug. 2	16	10
Dainty Duchess	33	" 2	14	4

RADISH.

Only one variety was grown, Early Scarlet White Tipped; this proved fairly satisfactory.

SQUASH.

Ten varieties of squash were tested of which Golden Hubbard, Delicata, Delicious and Heart of Gold were the most satisfactory from a culinary point of view; the long white vegetable marrows are out of favour and cannot be given away in this district. The seeds were sown in strawberry boxes May 5, and planted out in the open ground June 18.

TOMATOES.

Variety.	Quantity of ripe fruit picked. per acre.		Yield per acre.					
	For week ending Sept. 11.	For week ending Sept. 18.	Ripe.		Green.		Total.	
	lb.	lb.	Tons	lb.	tons	lb.	tons	lb.
Bolgiano Extra Early Wealthy	1224	3264	17	1512	3	1888	21	1400
Alacrity 14B	1904	2992	16	640	5	1424	22	64
Ponderosa	2992	4896	16	368	4	1792	21	160
Ponderosa Golden	544	3536	14	1910	3	528	18	438
Livingston Globe	.....	816	14	1376	4	704	19	580
Line-bred Northern Adirondack	1360	5440	13	1472	2	1028	16	500
Alacrity 12B	2176	2448	12	198	4	976	16	1174
Rennie Earliest	1632	5440	11	1664	4	1248	16	912
Prosperity	.....	...	11	576	2	1984	14	560
Matchless	.....	...	10	673	4	568	14	1241
Sunnybrook Earliana	2108	3808	9	1652	5	1424	15	1076
Bonny Best	.....	4624	9	1584	6	1872	16	1456
Johnson Jack Rose	816	2720	8	1544	6	240	14	1784
Trophy	.....	.....	8	1544	4	432	12	1976
Chalk Early Jewel	1632	544	7	1096	11	32	18	1128

FREDERICTON.

TURNIPS.

Eight varieties of turnips were sown for table purposes on the 2nd June and gave excellent results, particulars of which are given below:—

	Bush.	Lb.
Best of All	1,805	38 per acre.
Westbury Purple Top	1,483	34 " "
Bangholm Purple Top	1,452	" "
Sutton Purple Top	1,425	25 " "
Skirving Purple Top	1,318	45 " "
Favourite	1,151	2 " "
Carter Invicta	1,140	24 " "
Hall Purple Top	1,093	3 " "

POTATOES.

A number of experiments were planned in connection with potato growing, but the weather in May and June was abnormally wet and the land upon which the work was to be done was newly cleared, not yet underdrained nor levelled, which make a combination of conditions which prohibited the carrying out of much of this work.

Seven acres of potatoes were grown. Four acres were under fertilizer tests, the stock was pure Green Mountain and Commercial Green Mountain, on plots of one-twentieth acre each. The yield varied on the different plots from 103·3 bushels to 304 bushels per acre. The average yield for the sixty-eight plots was 199·78 bushels per acre.

The potatoes were planted with a potato planter on June 14. Seed was cut about three eyes to the set.

The soil was a sandy loam, with a stiff clay subsoil, and previous to tile draining in 1913 was very wet. The whole area covered by these plots was planted to potatoes in 1914 without fertilizer of any kind and gave a crop of 309 bushels per acre.

The ground was kept well cultivated; either the single or two-row cultivator was run through the plots, followed by the horse hoe weekly. Cultivation began within one week of planting and was continued until August 1. Spraying with Bordeaux mixture and arsenate of lead began the latter part of July, and seven applications were made, using about 40 gallons per acre. Check rows unsprayed were left, an equal number in each plot. These died down three weeks before the crop was killed down by frost on October 11. Some of the tops were damaged by frost on September 25 and October 5. Plots were dug from the 18th to the 25th October. These potatoes had a growing season of 103 days from the day of planting till the first injury by frost. There was a good deal of rhizoctonia, some black leg and some of other diseases. Early blight and late blight in the check rows caused some diminution in yield. In fact it would be a conservative estimate to say that there would have been 20 per cent larger yield had there been no disease of any kind.

The stand looked fairly even over all the plots, though on the 1st of August a careful scoring of the plots was made and they varied from 50 per cent to 75 per cent of a perfect stand. The result of the spraying test was that the sprayed portion of the field gave 205 bushels and the unsprayed 163 bushels per acre, a gain from spraying of 42 bushels per acre.

COST OF PRODUCING AN ACRE OF POTATOES.

One acre was planted commercially with a one-row potato planter. This was land broken from the stump in 1914. It was ploughed in May, manured at the rate of 16 tons of green barnyard manure per acre, and an attempt made to get the manure incorporated with the soil with a heavy disc harrow. As the manure was very long

it was not possible to get the land in condition for a potato planter, so it was ploughed again and harrowed. On June 19, Empire State, Green Mountain, and Irish Cobbler potatoes, cut to three eyes to the set, were planted, and at the same time 400 pounds of commercial fertilizer was applied through the planter. This fertilizer was made up of 50 pounds sulphate of ammonia, 50 pounds nitrate of soda, 250 pounds acid phosphate, 50 pounds muriate of potash (approximately a 4-9-6 mixture). The crop was cultivated five times and hilled up three times. It was sprayed with poisoned Bordeaux mixture six times. Check rows were left unsprayed and figures of the gain from spraying are given below. The crop was harvested on October 15. The yield was reduced somewhat by early and late blight, rhizoctonia, mosaic, and other diseases.

The cost of production was made up as follows:—

Seed, 21 bushels at 60 cents per bushel	$12 60
Cutting seed at 10 cents per bushel	2 10
Ploughing land twice at 32 cents per hour	3 20
Harrowing twice	64
Harrowing in manure with disc harrow	1 28
Manure, 16 tons at $1	16 00
Applying manure with spreader	2 72
Fertilizer, 400 pounds applied in row when planting	6 37
Planting, man, boy and team, 3 hours	1 41
Cultivating, 5 times, 7½ hours at 25 cents	1 87
Horse hoeing (hilling), 3 times, 4½ hours at 32 cents	1 44
Hand hoeing (partially), 15 hours at 18 cents	2 70
Weeding (partially), 2 hours at 18 cents	36
Spraying, six times at $1.25	7 50
Digging, man and team, 4 hours	1 28
Picking up potatoes, 5 men, 5 hours each at 18 cents	4 50
Delivering from field, man and team, 3 hours	96
Total	$66 93

The total yield from the acre was 239·25 bushels, of which 220 bushels (80 barrels) were sold out of the field at $1.75 per barrel for table stock and the balance (7 barrels) of small and bruised tubers were sold for poultry feeding at 50 cents per barrel. The sale value of the crop was thus $143.50, which after deducting the cost of production left a profit balance of $76.57 for the acre.

The results of spraying the three varieties on the above acre were as per the following table:—

Variety.	Sprayed Bushels per acre.	Unsprayed Bushels per acre.	Gain by spraying. Bushels per acre.
Empire State	250	166	84
Green Mountain	235	189	46
Irish Cobbler	291	228	63

VARIETIES.

The growing of different varieties each in a single row of 66 hills was continued. The land on which they were grown was newly cleared and suffered from unevenness of surface and excessive rain so that the comparative test was not quite so fair as in previous years and no yields were obtained equal to those of 1913 and 1914. The figures for the three years are given. The source of the seed as given in the table does not mean that the seed was obtained in 1915, from the places mentioned, but was obtained from these places the first year it was grown at the Fredericton Station.

Variety.	From.	Total Yield 1913.	Total Yield 1914.	Total Yield 1915.	Marketable Potatoes 1915.	Unmarketable Potatoes 1915.
		Bush.	Bush.	Bush.	Bush.	Bush.
Abundance	Ottawa	374	259·5	127·6	61·6	66·0
Acquisition	"	457	335·4	270·6	90·2	180·4
American Wonder	Charlottetown	310	391·3	268·4	215·6	52·8
American Wonder	Ottawa	152	308·0	294·8	246·4	48·4
Brydon Beauty	"	319	308·0	264·0	187·0	77·0
Brydon	"	378	233·2	246·4	158·4	88·0
Burpee Extra Early	"	272	246·4	264·0	206·8	57·2
Burbank Seedling	Charlottetown	199	422·4	255·2	180·4	74·8
Carman No. 1	Indian Head	325	387·2	338·8	237·6	101·2
Carman No. 3	Ottawa	462	343·2	228·8	149·6	79·2
Clyde	"	479	378·4	261·8	171·6	90·2
Conquering Hero	"	418	316·8	268·4	114·4	154·0
Dalmeny Beauty	"	356	228·8	110·0	57·2	52·8
Dalmeny Beauty	Indian Head	462	356·4	312·4	242·0	70·4
Dalmeny Hero	Ottawa	435	334·4	248·6	140·6	99·0
Dalmeny Regent	"	360	299·2	325·6	211·2	114·4
Dalhousie Sdlg	"	365	316·8	268·4	184·8	83·6
Dreer Standard	Nappan	312	338·8	299·2	198·0	101·2
Dreer Standard	Ottawa	393	404·8	272·8	162·8	110·0
Dreer Standard	Charlottetown	440	475·2	281·6	242·0	39·6
Dreer Standard	Indian Head	442	466·4	323·4	253·0	70·4
Early White Prize	Nappan	418	387·2	259·6	215·6	44·0
Early White Albino	Ottawa	356	312·4	248·6	193·6	55·0
Early Norther	"	235	255·2	193·6	132·0	61·6
Early Hebron	"	334	510·4	275·0	211·2	63·8
Early Rose	"	299	127·6	206·8	140·8	66·0
Early Nebraska	"	415	334·4	167·2	105·6	61·6
Early Ohio	"	338	259·6	292·6	257·4	35·2
Early May	"	277	162·8	228·8	138·6	85·8
Early Six Weeks	"	347	237·6	305·8	215·6	83·6
Early Norther	Indian Head	323	382·8	301·4	231·0	70·4
Early Triumph			418·0	387·2	290·4	94·6
Eldorado	Ottawa	338	356·4	244·2	125·4	118·8
Empire State	Charlottetown	310	370·0	195·8	138·6	57·2
Empire State	Indian Head	402	475·2	259·6	209·0	50·6
Empire State	Ottawa	220	444·4	259·6	193·6	66·0
Empire State	Nappan	332	158·4	191·4	136·4	52·8
Eureka Extra Early	Ottawa	462	409·2	207·9	132·0	74·8
Everett	Nappan	422	475·2	260·7	127·6	132·0
Everett	Indian Head	204	215·6	255·2	191·4	63·8
Everett	Charlottetown	409	431·2	369·6	220·0	149·6
Factor	Nappan	220	215·6	143·0	85·8	57·2
Factor	Ottawa	385	198·0	272·8	149·6	123·2
Factor	Indian Head	224	365·2	237·6	184·8	52·8
Fannie Dean	Ottawa	343	268·4	143·0	94·6	48·4
Gold Coin	Nappan	270	426·8	200·2	129·4	70·4
Gold Coin	Ottawa	365	259·6	178·2	125·4	52·8
Gold Coin	Charlottetown	448	224·4	189·2	110·0	79·2
Green Mountain	Ottawa	402	237·6	222·2	136·4	85·8
Green Mountain Jr	"	308	281·6	191·4	143·0	48·4
Green Mountain	Charlottetown	446	272·8	176·0	70·4	105·6
Green Mountain	W. H. Moore	380	431·2	312·4	224·4	88·0
Houlton Rose	Ottawa	512	426·8	246·8	195·8	50·6

Variety.	From.	Total Yield 1913.	Total Yield 1914.	Total Yield 1915.	Marketable Potatoes 1915.	Unmarketable Potatoes 1915.
		Bush.	Bush.	Bush.	Bush.	Bush.
Houlton Rose	Indian Head	136	308·0	198·0	134·2	63·8
Irish Cobbler	"	413	488·4	297·0	255·2	41·8
Late Puritan (Br)	Ottawa	367	435·6	211·2	171·6	35·2
Late Puritan	Indian Head	455	343·2	216·7	140·8	74·8
Langworthy	Ottawa	233	484·0	367·4	308·0	59·4
Lowell Green Mountain	Gardiner, Me	...	...	301·4	250·8	50·6
Longkeeper	Ottawa	266	268·4	189·2	132·0	57·2
Cummings Pride	Carleton Co., N.B	...	...	259·6	171·6	88·0
Black Kidney	Kings Co., N.B	...	...	63·8	57·2	6·6
Manistee	Ottawa	387	404·8	222·2	176·0	46·2
McIntyre	Charlottetown	391	369·6	226·6	36·2	15·0
Morgan Seedling	Charlottetown	356	308·0	250·8	220·0	30·8
Morgan Seedling	Indian Head	444	400·4	261·8	204·6	57·2
Morgan Pink Seedling	Ottawa	523	365·2	314·4	248·4	66·0
Morgan Seedling	Nappan	198	220	165·0	125·4	39·6
Money Maker	Ottawa	440	233·2	279·4	228·8	50·6
Money Maker	Indian Head	242	488·4	298·1	253·0	44·0
Monarch	Ottawa	338	189·2	195·8	105·4	90·2
McCullough	York Co., N.B	176	316·8	266·2	195·8	70·4
New Chieftain	Ottawa	250	334·4	391·6	343·2	48·4
New Scotch Rose	"	631	290·4	272·8	231·0	41·8
New Queen	"	242	290·4	235·4	198·0	37·4
New Queen	Indian Head	259	193·6	277·2	226·6	48·4
New Colonist	Ottawa	418	237·6	304·7	228·8	74·8
Noreross	"	255	259·6	217·8	147·4	70·4
Pierremont Seedling	"	316	308·0	305·8	202·4	103·4
Provost	"	332	228·8	184·8	99·0	83·6
Prince Albert	"	308	418·0	275·0	191·4	83·6
Rawlings Kidney	Nappan	349	422·4	292·6	228·8	63·8
Rawlings Kidney	Charlottetown	396	404·8	294·8	220·0	74·8
Rawlings Kidney	Ottawa	360	360·8	286·0	189·2	96·8
Reeves Rose	Nappan	314	400·4	246·4	193·6	52·8
Reeves Rose	Indian Head	220	426·8	268·4	204·6	63·8
Rochester Rose	Indian Head	195	312·4	336·6	259·6	77·0
Rochester Rose	Charlottetown	308	387·2	202·4	184·8	17·6
Royalty	Ottawa	376	325·6	246·4	136·4	110·0
Rural New Yorker	Charlottetown	277	411·6	239·8	45·0	9·5
Satisfaction	Ottawa	387	334·4	182·6	136·4	46·2
Superlative	"	277	193·6	259·6	184·8	74·8
Scottish Triumph	"	303	343·2	237·6	171·6	66·0
Sharp Victor	"	319	228·8	173·8	81·4	92·4
Silver King	"	426	334·4	235·4	180·4	55·0
Sir Walter Raleigh	Ottawa	402	356·4	246·4	226·6	19·8
Table Talk	Nappan	545	400·4	255·2	112·2	143·0
Table Talk	Ottawa	360	246·4	259·6	198·0	61·6
Table Talk Br	"	352	206·8	226·6	173·8	52·8
Table Talk	Indian Head	422	347·6	334·4	220·0	114·4
Table Talk	Charlottetown	442	365·2	231·0	173·8	57·2
Todd Wonder	Ottawa	290	312·4	160·6	140·8	19·8
The Scott	"	325	294·8	301·4	220·0	81·4
The Moreton	"	371	255·2	338·8	268·4	70·4
Up to date	"	290	281·6	244·2	189·2	55 0
Vicks	Charlottetown	477	334·4	294·8	266·2	28·6
Vermont Gold Coin	Ottawa	268	343·2	259·6	211·2	48·4
Vermont Gold Coin	Indian Head	393	281·6	376·2	301·4	74·8
Wee McGregor	Nappan	422	440·0	332·2	277·2	55·0
Wee McGregor	Ottawa	479	325·6	211·2	176·0	35·2
Wee McGregor	Indian Head	272	343·2	236·2	170·2	66·0
Wee McGregor	Charlottetown	446	347·6	348·7	268·4	79·2
White Chief	Ottawa	415	294·8	266·2	195·8	70·4
White City	"	382	272·8	228·8	187·0	41·8

Variety.	From.	1915 Average of Row.	From selected Hills.
		Bush per acre.	Bush per acre.
Whitney Seedling No. 1	St. Stephen, N.B.	209	357·4
" " " 2	"	273	363·0
" " " 3	"	242	290·4
" " " 4	"	272	344·8
" " " 5	"	290	363·0
" " " 6	"	293	390·2
" " " 7	"	264	317·6
" " " 8	"	279	401·4
" " " 9	"	273	335·7

NUMBER OF EYES ON A SET.

A test was made with Empire State and Carman No. 1 potatoes by planting 200 hills of whole seed, 200 hills of seed cut to one eye, 200 hills cut to two eyes, and 200 hills cut to three eyes. The weather and soil conditions interfered with a close test but the figures are given subject possibly to change under better conditions.

	Whole seed.		One eye.		Two eyes.		Three eyes.	
	Large Bush. per acre.	Small Bush. per acre.	Large Bush. per acre.	Small Bush. per acre.	Large Bush. per acre.	Small Bush. per acre.	Large Bush. per acre.	Small Bush. per acre.
Empire State	264·8	37·0	146·4	10·5	202·2	14·5	209·2	25·0
Carman	173·3	50·7	171·8	18·8	87·7	23·9	162·4	31·2

The only deduction it would be fair to make under the circumstances would be that whole seed and sets cut to three eyes or over are likely to give a larger proportion of small potatoes in the hill than sets with one and two eyes, when the date of planting is as late as June 22.

The tests of potatoes from selected hills were entirely spoiled by the flooded condition of portions of the land.

FREDERICTON.

ORNAMENTAL GARDENING.

NURSERY STOCK.

The ornamental shrubs planted out in the nursery during the years 1913-14 have made very satisfactory growth and will be used for beautifying the grounds next season.

HEDGES.

Twenty-seven varieties of hedges were planted in the fall comprising the following varieties, viz.:—

Conifers—
Juniperus cupressifolia foemina.
" " *mascula.*
" *communis suecica.*
Larix leptolepis.
Picea Engelmanni..
" *excelsa.*
" *pungens Kosteriana glauca.*
Retinospora pisifera.
Thuya occidentalis.
" *occidentalis Wareana.*
Deciduous Shrubs—
Berberis Thunbergii.
Caragana arborescens.
" *frutescens.*
Caragana pygmaea.
Cytisus hirsutus.
Hydrangea arborescens.
" *paniculata.*
Ligustrum amurense.
Philadelphus Satsumi.
Rhamnus cathartica.
" *Frangula.*
Rosa rugosa.
Spiraea arguta.
" *japonica (callosa) rubra.*
" *Margaritae.*
" *van Houttei.*
Syringa Josikaea.

ROSES.

Fifty-three varieties of roses were grown and all did well, the following dozen proving satisfactory in every way:—

Caroline Testout.. .. ..H.T.—Clear pink.
Charles Lefebvre... .. ..H.P.—Crimson.
Frau Karl Druschki.. .. ..H.P.—Pure white, very large blooms.
General Jacqueminot.. .. ..H.P.—Bright crimson, beautiful in the bud.
Hugh Dickson.. .. ..H.P.—Brilliant crimson, shaded scarlet.
J. B. Clark.. .. .. H.P.—Deep scarlet.
Jonkheer J. L. Mock.. .. ..H.T.—Beautiful pink shaded carmine.
Killarney.. .. ..H.T.—Brilliant pink, a beautiful rose.
Mme. Abel Chatenay.. .. ..H.T.—Bright salmon pink, flushed carmine.
Mme. Melanie Soupert.. .. ..H.T.—Salmon yellow, suffused carmine.
Mrs. John Laing.. .. ..H.P.—Soft pink, free blooming and reliable.
White Killarney.. .. ..H.T.—Pure waxy white.

BULBS.

Five thousand eight hundred bulbs were planted in the fall of 1914 for spring flowering and bloomed in the following order: Snowdrops, crocuses, scillas, chionodoxa, early-flowering tulips, narcissi, late flowering tulips, anemones, *Iris hispanica* and *Iris anglica*. The bulbs were arranged in groups at regular intervals, having regard to colour effects and time of blooming, so that the border was bright with flowers during the earlier weeks of spring. The Darwin tulips were especially fine.

FREDERICTON.

ANNUALS.

The interest in annuals is steadily increasing and these easily grown flowers were very popular with visitors to this station. One hundred and seventy-eight varieties of annuals were sown in hot beds or the open ground. The seedlings were pricked out as soon as they were large enough to handle and finally transplanted to flowering quarters. Further details as to the date of sowing, height and blooming period are given in the following tables:—

ANNUALS sown in open ground.

Name.	Sown.	Height.	Began to Bloom.	Bloom over.
		Ft. Inch.		
Bartonia aurea		.. 10	June 26	Sept. 30
Candytuft (2 varieties)		.. 8	" 28	" 28
Godetia (3 varieties)		1 2	July 8	Oct. 5
Leptosiphon hybridus	June 1	.. 2	" 28	
Lupinus, mixed	" 1	.. 9	" 15	" 5
Malope, mixed	" 1	3 3	Aug. 10	
Nasturtium, dwarf (3 varieties)	" 1	.. 7	July 10	Sept. 28
Nasturtium, Climbing (6 varieties)	" 1		" 10	" 28
Poppy, Shirley	" 1			
Poppy, double carnation	" 1			

ANNUALS sown in Hot-bed.

Abronia umbellata	April 16	1 6	Aug. 3	Sept. 21
Acroclinium, double rose	" 16	1 2	June 26	Oct. 5
Alonsoa Warscewiczii compacta	" 16	.. 8	Aug. 10	" 11
Alyssum, Little Dorrit	" 16	.. 3	June 13	" 26
Amaranthus tricolor	" 16	1 6	Foliage plant..	
Antirrhinum, Intermediate (4 varieties)	" 16	1 ..	July 28	" 8
Antirrhinum, Tom Thumb (5 varieties)	" 16	.. 6	Aug. 5	" 8
Antirrhinum, Tall mixed	" 16	1 6	" 6	" 8
Antirrhinum, Double (3 varieties)	" 16	1 3	" 10	" 8
Arctotis grandis	" 16	2 6	July 1	" 5
Argemone hybrida grandiflora	" 16	3 3	" 3	" 28
Asters, (30 varieties	" 16	2 ..	Aug. 8	" 5
Balsam, Sutton Impd. Camellia-flowered	" 16	1 6	July 7	" 5
Browallia elata	" 16	1 6	" 21	" 5
Calendula officinalis flore pleno, (2 varieties)	" 16	1 ..	June 28	" 5
Carnation, annual mixed	" 17	.. 10	Aug. 20	" 5
Celosia plumosa	" 17	1 6	July 31	Sept. 28
" *cristata*	" 17	.. 6	Aug. 4	" 28
Centranthus macrosiphon	" 17	2 ..	" 20	" 28
Chrysanthemum, annual (2 varieties)	" 17	1 3	July 10	" 28
Clarkia	" 17	1 6	" 19	Oct. 5
Coreopsis (6 varieties)	" 17	1 6	" 9	Sept. 28
Cosmea	" 17	4 9	" 12	" 28
Dahlia, Single, Collarette	" 17	3 6	" 26	" 28
Daisy, Sutton Double	" 17	.. 4	Aug. 7	Nov. 15
Dianthus Heddewigii	" 17	.. 7	July 20	Oct. 5
Dimorphotheca aurantiaca hybrids	" 17	.. 9	" 22	Sept. 28
Eschscholtzia, The Geisha	" 17	.. 10	" 19	" 28
" mixed	" 17	10	" 21	" 28
Gaillardia, Sutton Double mixed	" 17	1 ..	" 27	Oct. 5
Helichrysum	" 17	4	" 23	" 5
Heliotrope (3 varieties)	" 17	6	Did not bloom	
Hollyhock (Henderson annual)	" 17	6	Aug. 15	Sept. 28
Impatiens Holstii Hybrids	" 17	Failed.		
Jacobaea, Double mixed	" 17	1 3	" 1	" 28
Kochia trichophylla	" 20	2 9	Foliage plant..	
Larkspur (3 varieties)	" 20	1 6	July 30	Oct. 5
Lavatera rosea splendens	" 20	3 ..	" 18	" 5

FREDERICTON.

ANNUALS SOWN IN HOT-BED.—*Continued.*

Name.	Sown.	Height.	Began to Bloom.	Bloom over.
		Ft. Inches.		
Linum grandiflorum rubrum	" 20	.. 9	" 15	" 5
Lobelia grandiflora, (Cobalt blue)	" 20	.. 4	" 21	" 5
Lobelia ramosa (tenuior)	" 20	.. 4	" 23	" 5
Marigold, French double	" 20	1 ..	" 18	Sept. 28
Marigold, French single	" 20	1 ..	" 18	" 28
Mignonette	" 20	Seed failed		
Mimulus	" 20	.. 4	" 4	" 28
Myosotis argentina	" 20	Failed		
Myosotis Ruth Fischer	" 20	"		
Nemesia (6 varieties)	" 20		" 22	" 28
Nicotiana affinis	" 20		" 19	" 2
Pansy (7 varieties)	" 20		Aug. 20	Nov. 15
Pentstemon		Failed		
Petunia (3 varieties)	" 20	.. 7	July 21	Sept. 28
Phlox Drummondii (7 varieties)	" 20	.. 6	" 13	" 11
Portulaca (2 varieties)	" 17		" 30	" 11
Ricinus communis major	" 19	3 6	Foliage plant	
Ricinus, mixed	" 19	3 6	"	
Salpiglossis, mixed	May 14	2 3	Aug. 11	" 11
Salvia (2 varieties)	" 13	1 3	" 19	" 11
Scabious	" 2	1 6	" 15	" 28
Schizanthus, Veitch Grandiflorus Hybrids	" 13	.. 10	" 11	" 11
Stocks	" 13	1 ..	July 28	" 11
Sunflowers, Henderson Red	" 18	7 ..	" 20	" 11
Swan River Daisy		Failed		
Sweet Sultan	June 1	1 6	" 30	" 11
Tagetes signata pumila	" 1	1 ..	" 24	" 11
Verbena, mixed	May 13	.. 6	Aug. 4	" 28
Viscaria cardinalis	" 13	.. 8	" 10	" 11
Zinnia, Sutton Giant mixed	" 13	2 3	" 20	" 11

SWEET PEAS.

The ground for sweet peas was deeply trenched in the fall and a liberal quantity of manure dug in and fertilizer composed of 5 pounds acid phosphate, 2½ pounds muriate of potash, applied at the rate of half an ounce per square yard, and lightly hoed in. The seeds were sown in flats one inch apart and the young plants pinched out after making the second pair of leaves. This pinching out causes strong laterals to start from the base; as soon as these reach 3 inches high they are gradually hardened off and then planted out 9 inches apart. The ground on either side of the row was thickly sprinkled with air-slaked lime, care being taken not to get too much on the plants. Nearly all varieties produced four blossoms on the stem, many of them measuring 1½ inches across the standard. Very little stripe occurred and practically no mildew. The following list gives a selection of the best dozen varieties from the 105 varieties grown at this Station:—

Asta Ohn—Lavender, large bloom, mostly fours, inclined to stripe at end of season.
King Manoel—The best maroon, very large blooms, threes and fours, nicely waved.
King White—The best white, large blooms, mostly fours, nicely waved.
Maud Holmes—A fine crimson, large blooms, mostly fours, nicely waved, practically sunproof.
Orange Perfection—Rich colour, large blooms, threes and fours.
Elfrida Pearson—Lovely shade of pink, large blooms, mostly fours, well waved.
Lady Evelyn Eyre—Pale shell pink, large blooms, mostly fours, exquisite form.
Lilian—Best of its colour, very large blooms, mostly fours, well waved.
Mrs. A. Ireland—Cream and rose bicolour, large blooms, threes and fours, nicely waved.
Mrs. C. W. Breadmore—Primrose buff, edged rose, large blooms.
Edith Taylor—Pleasing shade of rosy salmon.
Mrs. W. J. Unwin—Orange scarlet flake, large blooms, nicely waved.

FREDERICTON.

DAHLIAS.

A collection of dahlias, including a number from each group, were grown and the following fifteen selected as being satisfactory in every way:—

Paeony flowered	Geisha.
	Glory of Baarn.
	Queen Wilhelmina.
Cactus	Countess Lonsdale.
	Mrs. E. Mawley.
	Starfish.
	Kriemhilde.
Decorative	Mrs. Roosevelt.
	Jack Rose.
Single	Yellow Century.
	Scarlet Century.
	White Century.
Pompon	Crimson Queen.
	Little May.
	Snowclad.

SUMMER-FLOWERING CHRYSANTHEMUMS.

Forty-five varieties of summer-flowering chrysanthemums were grown. The following list gives the best dozen:—

Crimson Marie Masse—Crimson bronze.
Dundee P.—Deep crimson.
Glory of Sevenoaks—Bright golden yellow, large flowers, free bloomer.
Golden Glow—Clear yellow, very large blooms.
Jacquenette P.—Rosy-carmine, large sprays of medium size flowers.
Lady Duvol P.—Deep rosy pink, good size and form
Lillie—Pearl pink, nice habit.
Nydia P.—Pure white, a beautiful flower.
Ontario P.—Pink with silvery white shadings.
Tonkin—Reddish orange, large flowers.
Varieties marked "P" are Pompon

PERENNIALS.

The herbaceous perennials grew well and produced a profusion of bloom from spring till frost. One hundred and nineteen varieties were added in the fall. A detailed list is given below:—

Achillea Ptarmica flore pleno.
Aconitum Wilsonii.
Anemone japonica, 8 varieties.
Aquilegia, 4 varieties.
Aster, 7 varieties.
Boltonia, 3 varieties.
Campanula, 4 varieties.
Clematis Hendersonii.
Clematis recta.
Coreopsis grandiflora.
Delphinium, in variety.
Dicentra spectabilis.
Dictamnus, 3 varieties.
Doronicum, 2 varieties.
Epimedium, 5 varieties.
Euphorbia.
Gypsophila paniculata flore pleno.
Helenium, 5 varieties.
Helianthus, 2 varieties.
Hemerocallis, 9 varieties.
Hesperis matronalis.
Hibiscus Moscheutos, 6 varieties.
Lupinus.
Mertensia pulmonarioides.
Monarda didyma.
Oenothera Youngii.
Papaver orientale, 4 varieties.
Platycodon grandiflorum.
Polemonium, 2 varieties.
Pyrethrum, 2 varieties.
Spiraea, 6 varieties.
Statice latifolia.
Thalictrum aquilegifolium atropurpureum.
Trollius caucasicus Excelsior.
Valeriana officinalis.
Veronica spicata.

IRIS.

Twenty varieties of Iris were grown and every plant bloomed. Fifty plants of *Iris Kaempferi* were planted out in groups of ten in the fall.

PAEONIES.

Seventeen varieties of this important group of herbaceous perennials were transplanted from the nursery to the perennial border.

PHLOX.

Twenty-six varieties of this easily grown perennial were planted in the fall. The list of varieties under test is as follows:—

Phlox Arendsii Amanda.
" " Charlotte.
" " Grete.
" " Helene.
" " Kathe.
" " Louise.
" *divaricata.*
" *glaberrima suffruticosa* Miss Lingard.
" *paniculata* Antonin Mercie.
B. Comte.
Coquelicot.
Coquette.
G. A. Strohlein.
Gefion.
Henry Murger.
Jeanne d'Arc.
Mme. Paul Dutrie.
Mrs. Jenkins.
Pantheon.
Prof. Virchow.
R. P. Struthers.
Rosenberg.
Rynstrom.
Selma.
Thor.

EXPERIMENTAL STATION, STE. ANNE DE LA POCATIÈRE, QUE.

REPORT OF THE SUPERINTENDENT, JOS. BEGIN.

CHARACTER OF SEASON.

The spring of 1915 was late, wet, and cold. The lack of rain and heat in April delayed the thawing out of the soil until the middle of May. It was not possible to plant fruit trees before May 19, and even at this date it was found when planting the trees that the ground was frozen in certain places. The growth was at least two weeks later than in the past three years. From June 25 to July 25 there fell only 1·65 inches of rain, and all crops suffered from want of it. The months of August and September were more favourable as regards rain and temperature. The temperature was only moderately warm, but no frost was recorded in September. October was normal. The first frost to injure plants was registered on October 7, the temperature falling to 29·6° F. The flowers, which up to this time had been magnificent, were for the most part injured and were entirely destroyed by a very hard frost on the 18th. The months of November and December were fine autumn months from the horticultural standpoint. Enough snow fell at the end of December to protect the soil. From January 1 to March 31 the temperature was colder than the mean of the last three winters. February was the coldest month of the year, and the mean temperature of this month was 9° F. The coldest temperature of the winter was 22° below zero, which was on February 21.

FRUIT CROP.

Ordinarily, in the region near Ste. Anne, there is an abundant fruit crop. Notwithstanding that the crop of 1914 was good, the crop of 1915 will be still more noted for the quantity of fruit produced. These successive crops prove that the extra care given to the orchards for several years, such as pruning and spraying is well repaid.

It is deplorable to state that thousands of gallons of plums, damsons, and other good varieties were not picked, there being no market to sell them in. By reason of the difficulties of transportation and the uncertainty of the market at the date of harvesting, the buyers offered so low a price that several growers left their plums on the trees. A remunerative price was obtained for the early varieties, such as Mirabelle, Favourite, and Early Yellow, of which the fruit was ripe on August 18. The varieties Reine Claude de Bavay and Lombard had still some good fine fruit at the end of October, demonstrating that a plum orchard of well-assorted varieties can furnish plums from August 15 to the end of October. Apples were a little less abundant than in 1914, but the price was higher, as a rule, compensating well for the care in their production.

PLANTATION OF FRUIT TREES.

One hundred and thirty-two apple trees and twenty plum trees were planted on May 19 on a soil drained and well prepared during the summer of 1914. This plantation completes a commercial orchard of 10 acres containing 668 apple trees, representing 115 varieties; 209 plum trees, representing 30 varieties; 81 cherry trees,

representing 15 varieties; and 19 pear trees representing 8 varieties. The growth of the young trees was very satisfactory and the young wood was well ripened.

A certain number of young trees planted in 1913 had some good fruit. Among apples two trees of Trenton might be mentioned, a Montreal Beauty and a Hyslop crab apple gave some very good fruit. Three Lombard plum trees had their first fruit ripen on October 10.

The cherries planted in 1913 gave the following results from a tree each of six varieties:—

Variety.	In flower.	Ripe.	Harvested	Description
Early Richmond	June 3	Aug. 8	4 half pints	very fine.
Large Montmorency	" 7	" 10	4 "	very fine.
English Morello	" 12	" 15	3 "	small.
May Duke	" 3	" 8	2 "	very fine.
Vladimir	" 5	" 10	2 "	very fine.
Suesse Fouche Morello	" 10	" 12	2 "	very fine.

SMALL FRUITS.

The yield of small fruits was a medium one, but the fruit would have been much larger if there had been no drought in July as this hindered the development of the fruit. The currant maggot caused an appreciable amount of damage to the crop. The maggot penetrates the fruit, which falls to the ground and has no value for market.

RASPBERRIES.

Eight varieties of raspberries planted in 1914 gave a good yield. The King variety gave the first fruit of the season on July 17. The Columbian was the most productive and had the longest fruiting season. Following are the yields from four bushes of eight varieties:—

Variety.	No. of plants	Quantity in pints.	Date of 1st picking.	Date of 2nd picking.
Cuthbert (red)	4	7	July 24	Aug. 10
Columbian (purple)	4	8	" 29	" 30
King (red)	4	6	" 16	July 30
Brighton (red)	4	5	" 19	" 30
Shaffer (purple)	4	4	" 23	Aug. 10
Count (red)	4	4	" 23	" 4
Sarah (red)	4	4	" 24	" 2
Herbert (red)	4	3	" 22	" 4

STRAWBERRIES.

Eighteen varieties of strawberries gave their first crop this year. The crop was good and the fruit very fine. The varieties Haverland, Wm. Belt, Gandy, and Abington gave the highest yields. The fruit of the variety which gave the best crop had less regular fruit than the other three. The earliest varieties were Enhance, Abington, and Beder Wood; the latest varieties were Brandywine, Pocomoke, and Tennessee Prolific. Three sprayings with Bordeaux mixture were made to control rust with complete success. The first application was made before the development of the leaves; the second after the flowers fell, and the third after the picking season.

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VEGETABLES.

RHUBARB.

Five varieties of rhubarb planted in 1914 gave a good yield. The variety Linnæus was the first ready for the table; the variety Hobday Giant gave the largest crop. Of all the varieties, the Prima Donna was preferred.

ONIONS.

Three rows each 33 feet in length were planted of the three following varieties: Large Red Wethersfield, Yellow Globe, and Extra Early Red. An insecticide was used on each row against the root maggot as follows:—

First.—Hellebore—2 ounces to 1 gallon water.

Second.—Carbolic emulsion—hard soap, well sliced, 1 pound; crude carbolic acid, 1 pint; boiling water, 1 gallon.

The soap was dissolved in water, the acid added, and then churned violently. Before using it was diluted to 25 gallons.

Third.—Pyrethrum powder (fresh), 1 ounce to 3 gallons.

The insecticides above mentioned were applied at intervals of a week apart as follows:—

Variety.	Application of Insecticides.				Good Plants.	Insecticide.
	1st.	2nd.	3rd.	4th.		
Large Red Wethersfield	June 4	June 11	June 19	June 26	90%	Hellebore.
Yellow Globe Danvers	" 4	" 11	" 19	" 26	95%	Carbolic Emulsion.
Extra Early Red	" 4	" 11	" 19	" 26	90%	Pyrethrum Powder.

BEETS.

Five varieties of beets for the table were sown in the open on May 20. All the varieties gave a good yield of roots of good quality. The variety Eclipse is the one which has given the best yield for three years.

PEAS.

Four varieties of peas, namely, Thos. Laxton, Gradus, McLean Advancer and Stratagem were planted on May 20 in rows of 100 feet of each variety. These rows were divided into two equal parts of 50 feet. One part was harvested when the peas were ready for eating and the other at maturity. Furthermore, a test was carried out to learn if it is better to plant several varieties becoming ready for use at different seasons, or one early variety at intervals. The following table gives some details in regard to the results:—

Variety.	Sown.	Date of Harvesting.						Total.
		July 18.	July 26.	July 26.	Aug. 5.	Aug. 15.	Aug. 20.	
		lb.	lb.	lb.	lb.	lb.	lb.	lb.
Thos. Laxton	May 20	3	4	3½	2	.....	.....	12½
Gradus	May 20	2	3	4	2	.....	.....	11
McLean Advancer	May 20	.....	.....	4	4½	5	.....	13½
Stratagem	May 20	.....	.....	3	6	10	.....	19
Thos. Laxton	May 26	1	3	6	4½	.....	.....	14½
Thos. Laxton	June 3	.....	2	4	2	2	1	11
Thos. Laxton	June 11	.....	.....	2	4	3	4	13

RIPE.

Variety.	Sown.	Harvested.	Total Harvested.
			lb.
Thos. Laxton	May 20	Aug. 23	8
Thos. Laxton	" 26	" 30	7½
Thos. Laxton	June 3	Sept. 4	7
Thos. Laxton	" 11	" 10	6
Gradus	May 20	Aug. 28	10
McLean Advancer	" 20	Sept. 14	12½
Stratagem	" 20	" 18	10¾

Fifteen varieties of garden peas were planted for comparison. The varieties Telephone, Heroine and Juno gave the best yield. The earliest varieties were the Gregory Surprise, Premium Gem, and American Wonder.

ONIONS.

Onions Thinned to Different Distances.

Onions were thinned to one, two, and three inches between the plants, three good varieties being used, to learn what is the best distance to thin in order to obtain the highest yield and the best product. Later on the data gathered from the results for several years will establish the best distance to thin onions.

Production of Small Onions or Sets.

In order to obtain some sets from a very thick seeding of onions, three rows, each one hundred feet in length, were sown very thickly of the varieties Large Red Wethersfield, Yellow Globe Danvers, and Extra Early Red. To force the early maturity of the plants when the sets were about one-quarter to one-half an inch in

diameter the plants were allowed to remain about 200 plants to the foot. From this seed sown on well-prepared soil, the following results were obtained:—

Yellow Globe Danvers.—A row 100 feet in length sown May 24 and harvested October 2, yielded 4 pounds of fairly good sets.

Large Red Wethersfield.—A row 100 feet long sown May 24 and harvested October 2, yielded 8 pounds of good sets.

Extra Early Red.—A row 100 feet long, sown May 24 and harvested October 2 yielded 12½ pounds, very good sets for transplanting in the spring of 1916.

CABBAGE.

Protection of Cabbage against Root Maggot.

Two rows of twenty-five plants each of Early Jersey Wakefield and Copenhagen Market cabbage were planted alongside one another. The plants in one row of each variety were protected by tar-felt paper discs, whereas the other row had none. Two of the protected plants were destroyed by the maggots, whereas twelve plants not protected were destroyed. The experiment was repeated on two rows of cauliflower with exactly the same result, which demonstrates that the tar-felt paper discs have protected the plants sufficiently to compensate for the cost of labour in using them.

Cabbage—Test of Varieties.

Of twelve varieties of cabbage planted in 1915, the Copenhagen Market, Danish Summer Ballhead, and Early Jersey Wakefield were the earliest. The late winter varieties, Fottler Improved Brunswick and Improved Amager Ballhead, gave the best return. The red cabbage have not succeeded as well. The sowing was done in a hotbed on April 28, the plants were pricked out in May and planted out on June 7.

TOMATOES.

Tomatoes—Test of Varieties.

Nine varieties of tomatoes were tested in 1915. The Alacrity, selected from the Earliana at the Central Experimental Farm, has given the best results. The first ripe fruits were on this variety, and the fruit was abundant and of fine appearance. The other varieties preferred were Sunnybrook Earliana, Bonny Best and Prosperity.

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Tomatoes—Pruning and Supporting the Plants.

In order to learn whether it is advantageous to prune and support tomato plants different methods of pruning and supporting were begun this year and will be continued until some definite conclusion is drawn. We give here the results for three varieties planted in the open on June 4:—

Variety.	Distance.	Ready for use.	Ripe.	Remarks.
			lb.	
Earliana Sunnybrook	4 x 4 ft.	Aug. 30	5·8	not pruned or staked.
Bonny Best	4 x 4 ft.	" 25	6·4	not pruned or staked.
Earliana Sunnybrook	4 x 2 ft.	Aug. 25	5·8	pruned to 1 stem and staked with 5 ft. stake.
Bonny Best	4 x 2 ft.	" 27	6·0	pruned to 1 stem and staked with 5 ft. stake.
Earliana Sunnybrook	4 x 2ft.	Aug. 23	8·2	supported by 3 wires 12 inches apart.
Bonny Best	4 x 2 ft.	" 24	7·0	supported by 3 wires 12 inches apart.
Earliana Sunnybrook	4 x 2 ft.	Aug. 26	7·4	half of foliage removed, staked with 5 ft stake.
Bonny Best	4 x 2 ft.	" 28	6·7	half of foliage removed, staked with 5 ft. stake.

Green Tomatoes—Test of Methods of Ripening.

Twelve well-developed green tomatoes were harvested and exposed to the sun outside to find how they matured. The skin changed colour by the 10th day; the skin, however, had become wrinkled and heavy before taking on a good colour.

The same quantity was picked green as in the first case and suspended in a building where the mean temperature was 61·4° F. These green tomatoes became red by the eleventh day. The skin was not so wrinkled as in the first case.

Another equal quantity was put in a closed box. In this last case the fruit took on a good red colour on the ninth day.

A basket of green tomatoes after having been covered with straw was put in a closed box. The colour was good by the eighth day. In each of the four cases an equal number of tomatoes showing traces of red were put under the same condition and in each case they were ripe two days before the others.

The flavour of those exposed to the sun was good, though inferior to the fruit ripened on the plant; the pulp was also more fibrous with a very slight bitter taste. In the second case the firmness of the pulp was more pronounced than in the first case, fibrous, and a bitter taste somewhat pronounced. The fruit in the closed box was the least fibrous, the flavour being nearly equal to fruit picked from the plant. Covered with straw in a box the fruit was strongly bitter, the pulp was fibrous and the taste disagreeable.

TURNIPS FOR TABLE USE.

Eight varieties of turnips planted for the table gave good yields. The varieties Invicta and Skirving are considered the best.

SQUASH AND VEGETABLE MARROW.

Of the eight varieties tested the Long Vegetable Marrow is the most noteworthy from the point of view of production and keeping quality. The White Bush has not given as large a yield but is a desirable variety because of the small amount of space it takes up.

STE. ANNE DE LA POCATIÈRE.

PARSLEY.

The Double Curled variety of parsley is preferred. Sown May 20, it was ready for the table on July 19.

CUCUMBERS.

Seven varieties of cucumbers planted in hills gave a large yield. The varieties Prize Pickle and Cool and Crisp were the earliest. The Extra Early Russian and the Giant Pera gave the largest yields.

PARSNIPS.

Parsnips sown May 28 were ready for use August 20. The variety Improved Hollow Crown was thinned to 2, 3, and 4 inches apart. The largest yield was obtained from those thinned to 3 inches apart.

BEETS.

Beets were thinned to 2, 3 and 4 inches apart to learn if table beets thinned to the least distance would have less fibre than those left further apart. After two or three years' experience the conclusion reached ought to be interesting.

SALSIFY.

The variety Long White gave a good yield of superior quality.

CARROTS.

The varieties Improved Nantes and Half Long Danvers Improved are the earliest and of good quality. The same experiment in thinning the plants was tried with carrots as with beets.

LETTUCE.

Six varieties of lettuce were sown on May 18, the varieties Dreer All Heart and Iceberg are the best.

BEANS.

Of eleven varieties planted the Bountiful Green Bush gave the best yield and the longest pods. The results obtained with this desirable vegetable are given below:—

Variety.	Row.	Planted.	Ready for use.	Height.—Inches.	Yield.	
	ft.				lb.	oz.
Bountiful Green Bush	30	May 18	July 28	17	9	8
Extra Early Valentine	30	" 18	" 29	15	6	12
Extra Early Refugee	30	" 18	" 31	16	7	8
Kenney Gold Wax	30	" 18	" 30	17	4	4
New White Seeded Stringless Green Pod	30	" 18	" 25	16	6	4
Grennell Rustless Wax	30	" 18	" 25	15	7	
Refugee or 1,000 to 1	30	" 18	" 28	16	8	
Round Pod Kidney	30	" 18	" 28	16	6	8
Stringless Green Pod	30	" 18	Aug. 3	17	5	12
Valentine Wax	30	" 18	July 26	17	5	
Wardwell Kidney Wax	30	" 18	" 25	16	6	4

STE. ANNE DE LA POCATIÈRE.

POTATOES.

Yield of Varieties, 1915.

Variety.	Row.	Salable.	Small.	Total.	Yield per acre.	
	ft.	lb.	lb.	lb.	bush.	lb.
American Wonder	66	56	15	71	312	24
Aequisitioa	66	42	15	57	250	48
Clyde	66	58	14	72	316	48
Carman No. 1	66	24	8	32	140	48
Carman No. 3	66	61	20	81	356	24
Dalmeny Beauty	66	47	13	60	264	
Dreer Standard	66	64	13	77	338	48
Empire State	66	43	10	53	233	12
Factor	66	45	11	56	246	24
Gold Coin	66	44	20	64	281	36
Hard to Beat	66	22	10	32	140	48
Irish Cobbler	66	62	12	74	325	36
Late Puritan	66	36	20	56	246	24
Green Mountain	66	83	9	92	404	48
Money Maker	66	69	11	80	352	
Morgan Pink	66	65	18	83	365	12
Morgan Seedling	66	80	25	105	462	
Rawlings Kidney (Ashleaf Kidney)	66	90	8	98	431	12
Reeves Rose	66	34	5	39	171	36
Rochester Rose	66	53	13	66	290	24
Table Talk	66	65	15	80	352	
Vick Extra Early	66	69	13	82	360	48
Warrior (Davies)	66	82	8	90	396	

These twenty-three varieties of potatoes planted in 1915, will be given a five years' test to establish their relative merits.

Potatoes—Experiment with Different Kinds of Sets.

For this test the plots were each 66 feet in length by 30 inches in width. The sets were planted 12 inches apart and covered with four inches of soil. The planting was as follows:—

1. Sixty-six potatoes, 2 inches and less in diameter.
2. Sixty-six sets cut to one eye.
3. Sixty-six sets cut to two eyes.
4. Sixty-six sets cut to three eyes or more.

In the following table will be found the results that have been obtained with the different sets:—

Variety.	Date of Planting.	Sets.	Weight.	Salable.	Small.	Total.
			lb.	lb.	lb.	lb.
Warrior (Davies)	June 7	small	6½	81	10	91
Warrior (Davies)	" 7	1 eye	3	73	7	80
Warrior (Davies)	" 7	2 "	5½	76	7	83
Warrior (Davies)	" 7	3 "	6½	63	12	75
Empire State	" 7	small	6¼	114	22	136
Empire State	" 7	1 eye	3	75	22	97
Empire State	" 7	2 "	6	144	20	164
Empire State	" 7	3 "	6¾	105	30	135

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Cost of Producing an Acre of Potatoes.

Below will be found the cost of producing an acre of potatoes in 1915:—

Rent of land at $3 per acre	$ 3 00
Use of implements at 60 cents an acre	60
Cost of one-third of an application of 24 tons manure per acre, at $1 per ton	8 00
First autumn ploughing, 2 horses at 34 cents, 10 hours	3 40
Disc harrowing in autumn, 2 horses, 10 hours at 34 cents	3 40
Ploughing in spring, 2 horses, 10 hours at 34 cents	3 40
Disc harrowing, 2 horses, 5 hours at 34 cents	1 70
Harrowing with smoothing harrow, 2 horses, 2 hours at 34 cents	68
Drilling, 2 horses, 5 hours at 34 cents	1 70
Planting, hand work, 45 hours at 17 cents	7 65
First harrowing, 2 horses, 2 hours at 34 cents	68
Second harrowing, 2 horses, 2 hours at 34 cents	68
Hoeing and weeding, 1 horse, 10 hours at 27 cents	2 70
First spraying, 10 ounces of Paris green, 2 pounds arsenate of lead in 40 gallons water	95
Spraying hand work, 5 hours at 17 cents	85
Transporting the insecticide, 2 horses, 3 hours, at 34 cents	1 02
Hoeing and cultivating the soil, 1 horse, 10 hours at 27 cents	2 70
Second spraying, 6 pounds lime, 6 pounds sulphate of copper, 12 ounces Paris green, 40 gallons water	1 35
Transporting the spray mixture, 2 horses, 3 hours at 34 cents	1 02
Hand work, 5 hours at 17 cents	85
Hoeing, 1 horse, 10 hours at 27 cents	2 70
Third spraying, insecticide and Bordeaux mixture	1 35
Transporting the spray mixture, 2 horses, 3 hours at 34 cents	1 02
Hand work, 5 hours at 17 cents	85
Digging, 2 horses, 10 hours at 34 cents	3 40
Hand work, 80 hours at 17 cents	13 60
Picking and storing, 40 hours at 17 cents	6 80
Cartage, 2 horses, 5 hours at 34 cents	1 70
Hand work, 10 hours at 17 cents	1 70
Total cost	$79 45
Total yield per acre, ...bushels.	301
Cost per bushel to grow ....cents.	26·39

The soil was sandy and gravelly, rather poor but well suited to the production of potatoes. The subsoil was made up of coarse gravel very permeable to water and to air allowing the water to pass down very rapidly. The month of June and the month of July having been very dry, the potatoes were late in starting growth, but had favourable conditions at the end of July and in August.

With three sprayings the insects were controlled perfectly and the crop did not suffer at all from them. Our tools for the culture of potatoes were not the best adapted for economical production on a large scale, but compared favourably with those used by the majority of the potato growers of the region. There is no doubt but that with tools more suitable for growing potatoes in quantity the cost could be reduced about 25 per cent. It is proper to note that the season of 1915 was the most unfavourable for potatoes for the last five years.

BULBS.

Visitors paid much attention to the bulbs in 1915. The early varieties of tulips Joost van Vondel, Pottebakker, Cottage Maid, La Reine and Artus were in flower on May 22. Some thousands of flowers of varied colours could be seen during the first days of June. Four thousand five hundred additional bulbs were planted during the first days of November. In September, all the bulbs which had bloomed the previous spring were lifted from the ground. Before re-planting, the small bulbs were separated from the large ones and planted in a nursery.

STE. ANNE DE LA POCATIÈRE.

FLOWERS.

The permanent situation destined for floriculture has not yet been chosen. Three hundred and twenty varieties of annual flowers were sown on May 28 in a border 350 feet in length by 4 feet in width. Sixteen varieties of asters and seventy-two varieties of sweet peas gave a profusion of bloom. The cosmos, the everlasting, the salpiglossis and the snapdragons were remarkable as were the mauve lavatera and the clarkia. The Freneh marigold and the leptosiphon make very pretty borders.

ORNAMENTAL TREES.

A row of ornamental trees was planted for six hundred feet on the public road along the front of the farm. These trees comprised 50 European mountain ash and 50 Norway maple, planted alternately 15 feet apart, the objeet being in time, to remove the kind which proves the less useful: the permanent trees will then be 30 feet apart. The soil here is a heavy clay but well drained.

EXHIBITIONS.

The hortieultural products, ineluding flowers, were exhibited at the large district exhibitions at Montmagny and Ste. Anne de la Poeatière, and attraeted much attention on account of the number of varieties exhibited and by the quality of the products.

STE. ANNE DE LA POCATIÈRE.

EXPERIMENTAL STATION FOR CENTRAL QUEBEC, CAP ROUGE, QUE.

REPORT OF THE SUPERINTENDENT, GUS. LANGELIER.

THE SEASON.

The spring of 1915 was about an average one for earliness. Though snow was practically all away at the beginning of April, rather cold weather followed so that seeds were put in at approximately the usual dates. One of the most remarkable features of the season was the extraordinary length of time, for this district, during which there was no frost, that is from May 16 until October 23. This is fully a month longer than usual. It can be said that 1915 was favourable to horticultural plants, the only drawback being the prolonged drought of midsummer. This affected some of the vegetables considerably, cut down the yield of bush fruits, and decreased the size of bloom in flowers.

CROP OF FRUIT AND VEGETABLES ON STATION AND IN DISTRICT.

Apples and cherries were a medium crop, plums very good, also strawberries, whilst currants, gooseberries, and especially raspberries were very much affected by the drought of midsummer. All heat-loving plants such as tomatoes, peppers, egg plant, were very good, so were cucumbers. Melons, beets, carrots, parsnips, salsify, leek and onions were only medium, being kept back by the prolonged spell of dry weather which came a while after germination. Cauliflower, cabbage and celery did very well.

Investigations in horticulture at this Station relate to fruit, vegetables and ornamental plants. The total area devoted to this work is 20·37 acres.

FRUITS.

Under this head come tree fruits, grapes, bush fruits, and strawberries. There are 12·93 acres in fruit at Cap Rouge.

TREE FRUITS.

The tree fruits grown at this Station are apples, cherries, pears, plums, taking up 11·79 acres of ground.

Apples.

The apple orchards cover an area of 10·64 acres and contain 987 trees of 142 varieties. The following, planted in 1911 or afterwards, fruited in 1915 or before: Duchess, Granby, Jewel, McMahan, Milwaukee, Montreal Beauty, Montreal Peach, Okabena, Patten Duchess, Percival, Petrel, Renaud, Royal Table, Rupert, Transcendent, Trenton, Wealthy, Wm. Chambers, Wolf River, Yellow Transparent.

Cultural Experiment with Apples.

To throw some light on the question of the best cover crop for an orchard, a cultural experiment was started in 1914. In some rows, the grass is cut and the hay left as a mulch, in others the grass is cut and the hay taken off, in others rape is alternated with clover as a two-year rotation, whilst in others either red clover, vetches, or rape is used as an annual cover crop. The land is uniform all through, the trees were all planted the same year and are of the same varieties for each lot, so that in a few years this will be very interesting.

Cost of Establishing an Orchard.

A great many farmers wish to know the probable cost of establishing an orchard and to help them find this out, all expenses in connection with a block of 420 Wealthy and McIntosh trees are recorded. These trees are spaced 17½ feet in all directions with the intention of taking out the Wealthy in a few years and leaving the McIntosh 35 feet apart.

Best Varieties of Apples for Central Quebec.

The following are the varieties of apples which seem to be the best for Central Quebec, though the list may be changed in a few years after testing others at this Station:—

Summer: Yellow Transparent, Lowland Raspberry, Duchess.
Autumn: Peach of Montreal, Wealthy, Alexander.
Winter: Fameuse, McIntosh, Wolf River, Milwaukee.

CHERRIES.

There are fifty trees representing fifteen varieties and covering 0·28 acre of ground. The following varieties, planted in 1911 or afterwards, fruited in 1915 or before: Ceris de France, Grotte Morello, Montmorency Large, Montmorency Ordinare, Orel, Vladimih, Montmorency Large, combines, more than the others, high yielding propensity with fine fruit.

PEARS.

As it is problematic whether this kind of tree fruit will do well in this part of the country, only eleven were put in of three varieties and covering an area of 0·06 acre. They were all planted in 1911, have made a vigorous growth, but have not yielded any fruit yet.

PLUMS.

There are 209 plum trees in the orchards, comprising 40 varieties, mostly European and American, and occupying 0·81 acre of ground. Nearly every variety planted in 1911 had yielded by 1914 and there seems no doubt that for quick returns plums are ahead of apples. Very fine fruit was obtained from Bonne Sainte Anne, whilst good looking plums of high to medium quality came from Lombard, Moore Arctic, Brackett, Mankato and Sunrise. The three last named are American, whilst the others are European varieties.

GRAPES.

These cover an area of 0·3 acre and comprise 128 vines of 28 varieties. Most of them were winter-killed in 1915 when the mild weather, melting away all the snow, was immediately followed by hard frosts. Canada, McTavish and Yomaga were the only varieties to fruit in 1915. The plantation will be replaced in the spring of 1916 and in the autumn of the same year different cheap materials will be tried as covers to protect the vines against frost.

CAP ROUGE.

BUSH FRUITS.

The bush fruits grown at this Station are currants—black, red, white—gooseberries and raspberries; they take up 0·87 acre of ground.

CURRANTS.

There are 192 bushels, comprising 16 varieties of Black, 12 of Red, 3 of White, and covering an area of 0·15 acre.

Black Currants.

There are six bushes each of the following sixteen varieties: Black Champion, Boskoop Giant, Buddenborg, Climax, Clipper, Collins Prolific, Eagle, Eclipse, Kerry, Lee Prolific, Magnus, Ontario, Saunders, Success, Topsy, Victoria Black. One year after planting, the average per bush was 0·9 ounce or at the rate of 265 pounds per acre; two years after planting, 5 ounces per bush or 726 pounds per acre; three years after planting, 4 pounds 10 ounces per bush or 8,841 pounds per acre. The largest producer is Climax which yielded at the rate of 786, 1,301, 11,011 and 17,424 pounds per acre, the first, second, third, and fourth year after it was planted. Unfortunately this variety is not on the market, but Boskoop Giant is and showed itself a fairly good second. A number of plants of Climax are grown at the Station, from cuttings and seeds of the best bush, and it is expected that within a few years, hundreds of this fine variety can be distributed in the district.

Red Currants.

There are 78 bushes of red currants of 12 varieties. Fay Prolific has shown itself the best yielder with a production of 11,253 pounds of fruit per acre in 1915. Though this is not considered a very hardy variety, it does very well here, probably because the piece of ground where the currant bushes are gets an early and rather deep blanket of snow, which is a fine protection against the frost.

White Currants.

There are 18 bushes of three varieties, the best yielder of which was White Grape, which produced at the rate of 7,018 pounds of fruit in 1915.

GOOSEBERRIES.

There are ninety-six bushes of twelve varieties, green, red, yellow. The highest yielder is Silvia, but it is not on the market yet. Downing is one of the standard sorts, but it is not nearly as productive as Silvia or other varieties originated by the late Dr. Wm. Saunders.

RASPBERRIES.

There are ten varieties on trial, with an area of 0·64 acre. The varieties which seem best adapted to this district are King for an early crop, and Herbert as the main one. It is, however, possible that after a few years' test, other varieties may be found which will do better than these.

STRAWBERRIES.

There are thirty-two varieties on trial at this Station, with an area of 0·28 acre. This is getting to be an important crop in some parts of central Quebec, and the Island of Orleans, a few miles east of Quebec city, probably now produces more of this delicious fruit than the same area anywhere in the province. The best yielder in 1915 was Uncle Jim with 6,443 pounds per acre, closely followed by Dunlap with 6,417 pounds per acre. Excelsior was the earliest, but with medium sized fruit of fair to poor quality. After a few years' trial, the following varieties have been found suitable

for this district, but it is possible that others may be found later on to take their place:—

Name.	Season.	Size.	Colour.	Quality.	Yielder.	Shipper.
Excelsior	Very Early	Medium	Dark red.	Medium	Productive	Very firm.
Glen Mary	Mid-season	Large to very large	Crimson	Very good	Very productive	Firm.
Dualap	Early	Large	Dark red.	Good	Very productive	Firm.
Uncle Jim	Mid-season to late	Very large	Bright red	Good to very good	Very productive	Fairly firm.
New Globe	Late	Large to very large	Dull red.	Medium to good	Very productive	Very firm.

VEGETABLES.

The area in vegetables at Cap Rouge in 1915 was 3·96 acres and all the leading varieties were grown of practically all kinds which will give satisfactory results in the district.

POTATOES.

Twenty-two varieties were in the trial plots in 1915. The soil was a sandy loam with shale a couple of feet below and was manured at the rate of about twenty tons per acre. The Colorado beetle was kept in check by Bordeaux mixture to which half a pound of Paris green was added per 40 gallons of water; this also warded off fungous diseases. The sets were cut of liberal size with two or three eyes each and were planted in drills. The piece of ground was very uniform which gave each variety the same advantage.

The following table gives details for 1915:—

YIELD of Potatoes at Cap Rouge in 1915.

Name.	Marketable.		Small.		Total.		Marketable.	Rank.	
	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.		Small.	Total.
Irish Cobbler	209		24	12	233	2	1	4	1
Morgan Seedling	184	48	26	24	211	12	2	2	2
Vick Extra Early	165		11		176		3	17	4
Carman No. 1	156	12	23	6	179	18	4	6	3
Gold Coin	156	12	19	48	176		5	8	5
Late Puritan	151	48	15	24	167	12	6	12	6
Carman No. 3	151	48	8	48	160	36	7	21	8
Dreer Standard	147	24	15	24	162	48	8	13	7
Money Maker	136	24	16	30	152	54	9	11	10
Factor	129	48	15	24	145	12	10	14	11
Rawlings Kidney	122	4	13	12	135	16	11	15	12
Table Talk	118	48	35	12	154		12	1	9
Clyde	99		8	48	107	48	13	22	15
Hard to Beat	94	36	18	42	113	18	14	9	14
Warrior (Davies)	92	24	26	18	118	42	15	3	13
Dalmeny Beauty	88		13	12	101	12	16	16	16
American Wonder	72	36	17	36	90	12	17	10	17
Rochester Rose	48	24	24	12	72	36	18	5	18
Empire State	48	24	9	21	57	45	19	20	19
Morgan Seedling Pink	46	12	11		57	12	20	18	20
Reeves Rose	41	48	11		52	48	21	19	21
Acquisition	24	12	22		46	12	22	7	22
Total	2,484	52	386	33	2,871	25			
Average for 1915	112	57	17	34	130	31			

The five highest yielders, for an average of five years are:—

	Bush.	Pounds per acre.
Money Maker	248	5
Irish Cobbler	234	18
Table Talk	226	12
Late Puritan	221	5
Gold Coin	218	58

GARDEN BEANS.

Particular attention was paid to garden beans and no less than 33 varieties and strains have been tried since 1911. The "limas" were dropped because the season is rather short for them; of the "kidneys," the pole varieties were left aside because staking is a costly proposition and also because they are not so hardy as the "bush" sorts and must be sown a little later. Amongst the "dwarfs," the "wax" or "butter" beans are in much greater demand, though some of the "green-podded" are really of better quality. Everything has now been discarded with the exception of the six following varieties: Challenge Black Wax, Hodson Long Pod, Wardwell Kidney Wax, Davis Green Pod, Refugee or 1000 to 1, Stringless Green Pod. In 1915, the heaviest yielder was Hodson Long Pod, at the rate of 470 bushels per acre, which is 30 pounds and 13 ounces for a row of 30 feet. This is quite exceptional, though, as the seven leading varieties only yielded at the rate of 193 bushels per acre, during the last five years. The earliest variety, as usual, was Challenge Black Wax which was the lowest yielder. Its precocity makes it valuable, as prices always rule higher at the beginning of the season. It took sixty-four days after sowing the seed to have it ready for market, whilst Hodson Long Pod took seventy-eight and the average for the seven leading varieties was seventy-two.

GARDEN BEETS.

There are different shapes in garden beets, long, intermediate, top, globe, ovoid, turnip. The first two are generally grown to be kept through winter, but the others, especially the globe, are fast taking the place of all others. At one time, it was taken as granted that the longer shaped a garden beet was, the later it was, and vice versa, which placed the turnip-shaped kinds at the head of the list for earliness. But of late, the round or globe-shaped varieties have been much improved and seem to be superseding all others. For a discriminating market a beet more than two inches in diameter is not considered at its best and it is well to grow varieties which will reach this size as soon as possible. Of the twenty varieties and strains tried at this Station since 1911, Eclipse has been found the most satisfactory, both for earliness and for yield. It has the distinction of being thoroughly bred and there is less chance with it than with other varieties of getting strains totally differing from each other when buying seed from several sources.

CABBAGE.

Red and Savoy varieties are not much grown in this district though the latter are of the highest quality for home use. Amongst the early varieties, Early Jersey Wakefield and Copenhagen Market are certainly the best, the first being conical or pointed and the latter round. The Wakefield is a few days earlier than Copenhagen Market but not nearly as good a yielder. Succession is a good variety to follow these early kinds, and any good strain of the Danish Ballhead group is the best for winter use on account of its invariably good keeping qualities.

CAP ROUGE.

CARROTS.

As for garden carrots, the long varieties are not now extensively grown, because they are later than the others and require a deeper soil; they also seem to lack quality and get too coarse and fibrous. French Horn and Oxheart are very good early ones, whilst Half Long Chantenay is a standard sort for the general crop.

CAULIFLOWER.

Good varieties are Early Snowball, Veitch Autumn Giant and Extra Early Paris. The last named, tried in 1915 for the first time, gave by far the largest heads and promises to beat all the others, if it continues as it has started.

CELERY.

Golden Self Blanching and Paris Golden Yellow are two of the best strains of the white sorts, the first being now more extensively grown than all the other varieties combined. But for a real *connoisseur*, the brittle and high quality green Giant Pascal is the best, besides being a good keeper.

CORN.

Early Malcolm, out of thirty varieties and strains tested, was still at the head for the number of ears produced; it was also the earliest of all the sweet varieties and only a day later than the common flints used in the district. Other varieties are Golden Bantam, a general favourite, for mid-season, and Country Gentleman, for a late sort.

CUCUMBERS.

Chicago Pickling is one of the best small varieties whilst a good strain of White Spine cannot be much improved upon to eat green. But there is often more difference between strains than between varieties, in cucumbers, and one must be sure of getting a good one.

LETTUCE.

Lettuce is sometimes classified as (a) cos, (b) curled, (c) head. The first, though in great demand in some of the large European cities, is hardly known in this country. The second is not a prime favourite on Eastern markets, except for forcing, and Grand Rapids is by far the most popular for this purpose. The "head" or "cabbage" sorts may be subdivided into "butter" and "crisp." The first, that is the "butter," are mostly sought after, and varieties such as Dreer All Heart, Iceburg, and Victoria generally give good satisfaction.

ONIONS.

Red Wethersfield again showed itself the most productive variety, and as it is generally a good keeper, it is highly recommended. Yellow Globe Danvers is all right for those who prefer an onion of this colour, and for the person who places size and appearance foremost it is hard to beat Prize Taker.

CAP ROUGE.

PARSLEY.

The new variety from Denmark, Dwarf Perfection, was still so much ahead of all others that it seems nearly in a class by itself, and should supplant all others if it continues to lead for a couple of years more.

PARSNIPS.

A couple of varieties are tried each year alongside of old reliable Hollow Crown, but the latter nearly always comes out first for yield.

PEAS.

Thirty-two varieties and strains were tried and, as usual, Gregory Surprise was the earliest. As it is of high quality and a fairly good yielder, it is strongly recommended for this district. It can be sown at intervals so as to secure a constant crop of green peas, or it can be sown at the same time as Thomas Laxton, McLean Advancer and Stratagem, which combination will also give a supply of fine edible peas from early to late in the season.

RADISHES.

Two varieties which do very well here are Turnip Scarlet White Tipped and White Icicle. The former sells better on account of its colour, but the latter has the advantage of remaining longer without getting woody. A sort which is recommended for early use in hotbeds is Rosy Gem. Radishes can often be grown on ground where celery or tomatoes are to be planted and can be cut out of the way in time, if put in at the very beginning of the season.

SQUASH.

For a heavy yielder nothing is ahead of the Long Vegetable Marrow. To persons looking to quality first, the Crooknecks will no doubt appeal, whilst for those who only have a limited area at their disposal, the Long White Bush Marrow is just the thing. The demand for these, in this district, is very limited.

TOMATOES.

A variety tried here for the first time, Reine des Hâtives, was the earliest, followed by Danish Export which held the same distinction last year. Alacrity was five days later than the first and three days later than the second. A strain of Sparks Earliana gave the largest quantity of ripe fruit. This strain, closely followed by Reine des Hâtives, gave the largest quantity of ripe fruit during the first month, which is an important consideration. Alacrity has shown itself so uniformly early and productive during the last five years that it is yet considered the most valuable variety for this district.

TURNIPS.

Consumers want the purple tops and of these, Skirving was the heaviest yielder. For earliness, none of them came near Extra Early White Milan, a very good white sort.

OTHER VEGETABLES.

Besides the above, the following were grown and can be recommended for this district: Broccoli, White Cape; Brussels Sprouts, Improved Dwarf Paris Market; Celeriac, Large Smooth Prague; Egg Plant, New York Improved; Endive, Green Curled; Kale, Dwarf Green; Kohl Rabi, Large White Vienna; Leek, English Flag; Muskmelon, Montreal Market; Pepper, New Neapolitan; Pumpkin, Large Field; Salsify, Long White; Spinach, Victoria.

CULTURAL EXPERIMENTS WITH VEGETABLES.

Cultural experiments are going on at this Station with beans, beets, cabbage, carrots, cauliflower, celery, onions, parsnips, peas, potatoes, tomatoes, turnips. None of these experiments has, however, been started long enough to warrant definite conclusions.

BEANS.

The experiment is to find out whether it is better to plant a number of varieties of different seasons at the same time or to plant the same variety at intervals. On May 25, Round Pod Kidney Wax, Stringless Green Pod, Early Red Valentine, and Refugee were planted, whilst Round Pod Kidney Wax was planted again on June 1, 8, and 15. The yield was about the same one way or the other in 1915, and so was the length of the season during which "snap" beans could be had.

BEETS.

The experiment is to find the best distance at which to thin plants: 2, 3, or 4 inches. This will have to be continued a number of years before figures can be given.

CABBAGE.

The experiment is to find out the best practical method of protecting plants from root maggots, when set out. One lot received no protection, and only 17 per cent was marketable; a second lot was protected with tar-paper discs, and 80 per cent was marketable; the last lot was protected by cheap cheese cloth individual covers, and it also gave a crop of 80 per cent marketable heads. The results of one year would tend to show that the best practical protection is the tar-paper disc, as it is a great deal cheaper than the cheese cloth cover.

CARROTS.

The experiment is to find the best distance at which to thin plants: 1½, 2, or 3 inches. This will have to be continued a number of years before figures can be given.

CAULIFLOWER.

With this vegetable there are two experiments: (a) to find the best practical method of protecting the plants against root maggots; and (b) to find the best way of protecting the heads. For the first experiment tar-paper discs and individual cheese cloth covers were used, whilst for the latter, toothpicks, also twine served to tie the leaves which, in another lot, were simply broken and brought over the heads. None of the methods in either of the experiments gave much satisfaction, so that the results of a few more years will have to be waited upon.

CAP ROUGE.

CELERY.

The experiment is to find out the best method of blanching. Four lots were used: (a) Planted in trenches and blanched with soil; (b) planted on the level and blanched with soil; (c) planted on the level and blanched with paper; (d) planted on the level and blanched with boards. The lot blanched with boards gave the highest yield, followed by the one planted on the level and blanched with soil. However, this is only the result of one year and should certainly not be taken as definite.

ONIONS.

The experiment is to compare the earliness and the yield of a crop obtained from: (a) seed sown in the open, (b) plants started under glass and transplanted to open ground, (c) onion sets. The results of 1915 show that the early crop is obtained from the sets and the heavy yield from transplantations.

PARSNIPS.

The experiment is to find the best distance at which to thin plants: 2, 3 or 4 inches, but it will have to be continued for a few years before definite conclusions can be reached.

PEAS.

The experiment is to find out whether it is better to plant a number of varieties of different seasons at the same time or to plant the same variety at intervals. On May 22, Thomas Laxton, Gradus, McLean Advancer, and Stratagem were planted, whilst Thomas Laxton was planted again on May 29, June 5 and 12. The different varieties sown the same day gave a larger yield than the same variety sown at different dates.

POTATOES.

There were two experiments with potatoes: (a) kinds of sets (b) treatment of sets with gypsum before planting. In the first one, whole small potatoes, about two inches in diameter were compared with sets cut to 1, 2, and 3 eyes, with the result that for the same area there were respectively 72, 11, 62 and 92 pounds of marketable tubers from each lot in the above mentioned order. In the second one, sets treated with gypsum previous to planting gave nearly 25 per cent more potatoes than the untreated lot. This, however, is only the result of one year and should certainly not be taken as definite.

TOMATOES.

The cultural experiments with tomatoes consisted of comparing methods of: (a) starting plants, (b) pruning, (c) training, (d) ripening green or partly ripe fruit. In experiment (a) plants pricked twice before setting out gave, for a certain area, 152 pounds of ripe fruit, whilst those pricked once gave 160 and those not pricked at all gave 130. In experiment (b) the lot pruned to one stem gave 434 pounds of ripe fruit, whilst the lot pruned to two stems gave 597 pounds. In experiment (c) the lot left lying on the ground, contrary to expectations, gave more ripe fruit than the two lots which were tied to wires and to stakes; of these, the latter was the better. Two things must be remembered about this experiment: that it is the result of only one year, and that Earlianas were used and they certainly require less staking than mostly any variety. In experiment (d) there was very little difference between the three lots which were put to ripen outside in a ventilated glass-covered box, inside on shelves away from the sun, or in tightly covered boxes.

PLANT BREEDING.

This consists in selection only. In vegetables, work is done with beans, beets, cabbage, corn, cucumber, lettuce, muskmelon, onion, parsnip, peas, pepper, potatoes, radishes, squash, tomatoes, turnips, watermelon; in fruit, with apples, plums, cherries, currants, gooseberries, raspberries, strawberries.

That some advance is made can be seen by the results obtained on rows 30 feet long with garden beans in 1915:—

Variety.	Cap Rouge Selection.	Commercial Seed.	Increase from selection.
Hodson Long Pod	30 pounds 13 ounces	17 pounds 1 ounces	13 pounds 12 ounces.
Refugee	21 " 5 "	11 " 12 "	9 " 9 "
Stringless Green Pod	13 " 8 "	12 " 7 "	1 " 1 "
Wardwell Kidney Wax	22 " 7 "	19 " 7 "	3 " 0 "
Total	88 pounds 1 ounces	60 pounds 11 ounces	27 pounds 6 ounces.
Average	22 " 0 "	15 " 3 "	6 " 13 "

The average increase of 6 pounds 13 ounces for each variety per row of 30 feet corresponds to an increase of about 106 bushels per acre or a little more than 50 per cent of what the total crop should be to be a paying one, under average circumstances.

In corn, a Cap Rouge selection of Early Malcolm was the highest yielder amongst thirty varieties and strains tried in 1915, and it is from a selection of 1913 which was the heaviest yielder that year. It seems that blood tells for plant as well as for animal life.

In peas, both the heaviest yielder and the earliest ready for market were Cap Rouge selections.

Quicker results might sometimes be obtained, for yield and earliness, if any plant was used. But what is selected must be healthy and true to type, which means that not a few are rejected.

SEED GROWING.

Seed of a great number of varieties of vegetables and flowering plants has been successfully grown at this Station. Amongst the former may be mentioned beans, beets, cabbage, carrot, corn, cucumber, egg plant, lettuce, muskmelon, onion, parsnip, peas, pepper, pumpkin, radish, spinach, squash, tomatoes, turnip, watermelon; and amongst the latter can be named: acroclinium, alonsoa, alyssum, antirrhinum, aster, balsam, bellis perennis, brachycome, calendula, corn flower, clarkia, coreopsis, cosmos, delphinium, dianthus, dimorphotheca, eschscholtzia, gaillardia, helichrysum, iberis, kochia, sweet peas, lavatera, linum, lobelia, lupinus, lychuis, malope, matthiola, mimulus, nemesia, nicotiana, poppy, petunia, phlox, portulaca, mignonette, salpiglossis, salvia, scabiosa, French marigold, nasturtiums, verbena, pansy, zinnia.

That home-grown seed compares favourably with commercial seed is well shown by the following table giving yields of peas for rows of 30 feet:—

Variety.	Cap Rouge seed.	Commercial seed.	Increase from C. R. Seed.
	Quart.	Quart.	Quart.
Advancer	2·50	2·25	0·25
American Wonder	1·75	0·75	1·00
Dainty Duchess	4·00	3·50	0·50
Early Giant	2·25	1·50	0·75
Gradus	2·25	0·75	1·50
Heroine	3·25	2·75	0·50
Juno	2·75	2·75	0·00
Quite Content	3·25	2·50	0·75
Stratagem	2·75	1·50	1·25
Sutton Excelsior	3·50	2·75	0·75
The Lincoln	3·25	2·75	0·50
Average	2·86	2·16	0·70

This is an increase of 32 per cent, probably due to the fact that the home-grown seed was acclimated as in this case there was no selection and both kinds of seed produced strong plants. It must be remarked that the above commercial seed came from probably the five best known seedsmen of England and the United States.

Of the flower seed grown at Cap Rouge, it can truthfully be said that about 75 per cent of the varieties produced bloom which could compare favourably with that of plants from commercial seed, and in nearly every case, the home-grown seed germinated more quickly and produced stronger plants than the commercial seed.

ORNAMENTAL GARDENING.

Hundreds of annuals, perennials, shrubs, and trees are on trial and greatly add to the natural beauty of the Station grounds. Amongst the varieties which are recommended to farmers are the following:—

Annuals.—Antirrhinums (intermediate), saters, candytuft, coreopsis, phlox, poppy (Shirley).

Perennials.—Aquilegias, *Arabis albida,* campanula, delphiniums, hollyhocks, lupines, poppy (oriental);

Shrubs.—Hydrangea paniculata, Spiraea Van Houttei;

Hedges.—Rhamnus Frangula, Thuya occidentalis;

Roses.—Rosa rugosa;

Bulbs.—Narcissi, tulips.

The annuals were a little better than the average, though the blooms were somewhat small on account of the drought of midsummer; the perennials were mostly superior to what they previously were and were not very adversely affected by the dry weather; the growth of the shrubs and trees was very satisfactory; the hedges did well and were cut back for the first time since their plantation in 1911; the roses bloomed profusely and some of them until very late, the drought having less effect on them than on other flowering bushes; the bulbs were better than in 1914 and about an average of what they were for five years; the lawns, which were brown during the dry and warm weather of midsummer, soon recovered and were luxuriantly green when precipitation became normal in the autumn.

CAP ROUGE.

DISTRIBUTIONS.

A total of 714 apple trees, 147 currant and gooseberry bushes, 1,452 raspberry canes, 3,500 strawberry plants, 2,181 packages of vegetable seed, 3,064 packages of flower seed, with 564 flowering plants was sent out for distribution during the year. With each lot is sent a form to be filled in by the person who receives the consignment regarding the adaptability of the variety as to that particular place. The names of all those who do not answer these questions are taken off the lists, so that only interested parties receive seeds, plants or trees more than one year. The reports from the co-operators are of benefit to them as they must observe the growth and condition of what is sent to them, and also to the Station on account of the varied information which is obtained from different parts of the district. Last, but not least, good farmers are supplied with the varieties which have done very well here and which they can propagate for themselves and for others with great profit.

EXHIBITIONS.

Flowers, fruit and vegetables grown at Cap Rouge were shown at the two largest exhibitions in Quebec—Three Rivers and Quebec city—besides at four county shows, and at four New England fairs. What was sent to the latter was for the Department of the Interior, four special first prize ribbons being awarded, and a diploma was received from Three Rivers and Quebec. Whilst everything was done to satisfy the aesthetic point of view, the educational side was never forgotten. Competent men were constantly in attendance at all exhibitions held in the province of Quebec and a great many farmers showed their interest by asking questions and entering their names so as to receive the publications issued in Ottawa.

EXPERIMENTAL STATION, LENNOXVILLE, QUE.

REPORT OF THE SUPERINTENDENT, J. A. McCLARY.

The season of 1915 was, on the whole, fairly favourable for the production of horticultural crops. There was a rather heavy precipitation during the fruiting season of the strawberries, and quite heavy rainfalls later on during the season. There were two dry spells, but the drought was not of long duration, and consequently there was little, if any, appreciable damage done to the crops.

TREE FRUITS.

APPLES.

During the spring of 1915 extensive work was carried out in connection with establishing the orchards on the farm. This was by no means a small task but was accomplished very satisfactorily.

There were two large apple orchards planted, one to be known as the "Cultural Orchard" and the other as the "Variety Apple Orchard."

The Cultural Orchard is situated west of the Cookshire road, and extends back to the high banks of the St. Francis river. It contains 869 trees of sixteen of the best commercial varieties of apples, and occupies 10·5 acres of land.

This orchard site is of a slightly rolling nature, with a decided southwestern exposure. This may not be the best exposure for an orchard but the soil and site were more suitable than elsewhere. The soil is, in most parts, of a sandy nature, with a clay or gravel subsoil. In two or three places the soil runs into heavy clay but the trees so far seem to thrive as well on this heavy soil as they do on the lighter portions, although on the clay they are liable to grow too late in the autumn and be injured by winter.

As the site is high and rolling it was deemed unnecessary to put in an extensive system of under-drainage. However, a tile was laid through one corner where the land is heavy and low.

All the varieties did exceptionally well, having good stock, carefully selected and packed, and heeled in upon arrival at the farm until planting time. Only six trees out of the 869 failed to grow.

The following is a list of the varieties including the number of trees of each variety.

Standard Trees.—McIntosh, 173; Famense, 92; Bethel, 37; Alexander, 21; Wolf River, 20; Blue Pearmain, 20; Scott Winter, 19; St. Lawrence, 19; Langford Beauty, 19; Lowland Raspberry, 19.

Fillers.—Wealthy, 113; Milwaukee, 96; Dudley, 89; Duchess, 56; Yellow Transparent, 38; Crimson Beauty, 38.

Variety Orchard.—The variety apple orchard is situated on the rolling lands at the north side of the horticultural area, and east along the Cookshire road from the vegetable plots.

This orchard is made up of 364 trees of 109 varieties. Some of the varieties have been grown commercially, while the larger portion of the trees are new varieties

from the Central Experimental Farm, and although their performance is known there, it is yet to be determined whether they will prove satisfactory here.

The orchard is planted on the "square" system, with seven standard trees in each row, and two trees each of three varieties used in each row as fillers, making thirteen trees per row and 28 rows in the orchard.

During the season the trees made remarkably good growth, and entered winter conditions in excellent shape.

From the time of planting in May until July 15 the ground for a distance of 4 feet on each side of the rows of trees was kept cultivated, after which a cover crop of rape was sown. This cover crop grew very rank and covered the ground splendidly by late autumn. However, the growth was so rank that the rape had to be removed from around the trees for a distance of 18 inches to allow the trees to ripen properly. This was done in September.

The following is a list of the standard and filler trees used: Seven trees of each of the following varieties: Montreal Peach, Charlamoff (Pointed Pipka), McMahan, and Early Strawberry.

The following is a list of the trees received from the Central Farm, seven of each variety: Galetta, Joyce, Lobo, Horace, Atlas, Ramona, Severn, Glenton, Galena, Marcus, Thurso, Luke, Mendel, Danville, Rocket, Donald, Niobe, Nestor, Rosalie, Tasty, Gerald, Aseot, and Grover. Eight trees of each of the following varieties: Crusoe, Battle, Melba, Pedro, and Petrel.

List of fillers, two trees of each:—

Beginning nearest Cookshire Road—

Pinto (O-1363).
Nile (O-1377).
Pinto (O-1378).
Sandow (O-1388).
Bingo (O-1395).
Elmer (O-1396).
Radnor (O-1406).
Kildare (O-1420).
Monitor (O-1422).
Ripon (O-1424).
Kim (O-1425).
Service (O-1451).
Cobalt (O-1468).
Bruno (O-1472).
Norah (O-1487).
Rochelle (O-1494).
Walter (O-1495).
Canada Red (O-1496).
La Victoire (O-1497).
Moscow Pear (O-1502).
Anis (O-1540).
Keen Crimson (O-1541).
Anisim (O-1542).
Consort (O-1198).
Blushed Calville (O-1223).
McMahan (O-1216).
Seedling from W. Judge (O-1264).

Second Lot of 2 from Cookshire Road—

Carno (O-1544).
Nemo (O-1550).
Johnson Seedling (O-1555).
Trenton (O-1204).
Baxter (O-1219).
Sorel (O-1232).
Granby (O-1233).
Rouleau (O-1563).
Shaffner Special (O-1567).

Third Lot of 2 trees each from Cookshire Road—

Jewel x Tetofsky (O-1513).
Jewel x Rideau (O-1514).
Jewel x Rideau (O-1516).
Margery (O-1517).
Trail (O-1518).
Ruth (O-1519).
Pyrus baccata x Tetofsky (O-1520).
Northern Queen x Rideau (O-1521).
James (O-1522).
Pioneer x McIntosh (O-1523).
Pioneer x McIntosh (O-1524).
Jewel x Rideau (O-1525).
Northern Queen x Rideau (O-1526).
Martin (O-1527).
Jewel x Simbirsk (O-1528).
Pyrus prunifolia x Red Astrachan (O-1529).
Northern Queen x Rideau (O-1530).
Jewel x Tetofsky (O-1531).
Columbia (O-1532).
Pioneer x McIntosh (O-1533).
Pioneer x McIntosh (O-1534).
Jewel x Rideau (O-1535).

Fillers from other nurseries, two of each variety:

Blue Pearmain.
North Western Greening.
Tolman.
Arctic.
Muskoka Beauty.
Salome.
Gypsy Girl.
Queen of the North.
American Golden Russet.
Hibernal.
Scarlet Pippin.
Astrachan.
Jones Red Snow.
Queen of North.
Winter St. Lawrence.
Winter Arabka.
Excelsior (1).
Montreal Beauty (Crab Apple).
Martha (Crab Apple).
Whitney (Crab Apple).

CHERRIES, PEARS, AND PLUMS.

The work in these orchards was not very extensive as only a few varieties were planted in each orchard. These orchards are arranged in blocks adjoining each other and are located on the south side of the variety orchard towards the west end of the horticultural area.

The site is on a knoll with a southern and southwestern exposure. The soil is sandy in places, but runs into heavy clay further back.

For convenience of cultivation, the trees in the orchard were planted 15 by 20 feet apart so that the apple orchard and plums, pears and cherries could be cultivated without any inconvenience.

Cherries.—Cerise d'Ostheim, 6; Herzformige Weichsel, 5; Vladimir M., 3; Dye-house, 4; Vladimir, 4; Olivet, 4; Wragg, 4.

Pears.—Zuckerbirne, 2; Grev. A. W. Mettekes, 2; Kurskaya Pear, 2; Lemon Pear, 3; Bessemianka, 7; Vermont Beauty, 7.

Plums.—Snelling Seedling, 15; Cheney Seedling, 12; R. B. White Seedling, 33; Caro Seedling, 2; Consul Seedling, 3; Wolf, 5; Hawkeye, 5; Weaver, 5.

SMALL FRUITS.

RASPBERRIES.

This plantation is located in the same range with the currants and gooseberries. The rows of raspberries are planted between the currants and gooseberries with the object of keeping the varieties of raspberries from mixing. The arrangement allows the rows to be 12 feet apart alternating with other bush fruits.

All the varieties did well and showed every possibility of their wintering in good condition.

The varieties are as follows: Herbert, King, Count, Sarah, Brighton, and Eton.

GOOSEBERRIES.

A few varieties were planted, those that arrived and were planted in good time making comparatively good growth.

The varieties are as follows: Downing, Whitesmith, Carrie, Josselyn, Houghton, and Oregon Champion.

CURRANTS.

The currant plantation contains 23 varieties, planted in rows 12 feet apart and 6 feet apart in the rows, there being six bushes to each variety.

To simplify record work the plantation is divided into ranges 30 feet wide which enables the records being taken on each separate variety in a range, and greatly facilitates the work.

LENNOXVILLE.

All the varieties did well, they are as follows:—

Black.—Magnus, Collins, Prolific, Clipper, Eclipse, Eagle, Boskoop Giant, Buddenborg, Kerry, Victoria Black, Saunders, Climax, Lee Prolific.

Red.—Pomona, Victoria Red, Wilder, Cumberland Red, Red Dutch, Cherry, Greenfield, Rankins Red, Red Grape, Perfection, Fay.

White.—Large White, White Grape, White Cherry.

GRAPES.

The vineyard is located at the extreme west end of the horticultural area fronting on the Cookshire Road, just opposite the cultural orchard. The field is triangular in shape and contains approximately two acres.

The soil is of a variable nature being quite heavy clay soil in places, running into gravel on the higher parts.

Only eight rows of standard vines were planted last spring, but they did very well. They were planted in rows nine feet apart, and ten feet apart in the row.

A cover crop of beans was sown between the rows of grapes, and the land kept thoroughly cultivated as long as it was practicable. As soon as the beans were ripe they were carefully harvested and thrashed and yielded approximately 17 bushels. They were sold for $4.25 per bushel. The vines were pruned and covered with soil on November 2 and 3.

The varieties with number of plants of each, are as follows: Brighton, 30; Brant, 6; Barry, 2; Campbell Early, 2; Champion, 2; Concord, 2; Delaware, 3; Hartford, 2; Herbert, 6; Lindley, 28; Moore Early, 30; Moyer, 30; Moore Diamond, 6; McTavish, 3; Niagara, 2; Peabody, 4; Starr Early, 3; Salem, 2; Vergennes, 6; Wilkins, 14; Worden, 2; Yomago, 4.

STRAWBERRIES.

The twenty-five varieties planted out in 1914 wintered very well considering the severity of the winter. Just as soon as the danger of heavy freezing was past the straw mulch was removed from the plots and the plantation cleaned up.

Some of the new varieties from Ottawa did very well, in fact some of these varieties yielded very large crops, but it was noticed that the quality of the fruit was quite inferior to other varieties which yielded smaller crops. The varieties which proved best are as follows: Valeria, Portia, and Desdemona.

The performance of each variety is given in the following table:—

Variety.	First ripe fruit.	Date last picking	Rust.	Size of fruit.	Total yield in lb.	Total yield in lb. per acre.	Remarks.
Ruby	June 29	July 21	S.	L.	24·60	11,162	The fruit was very large, irregular and coarse, being soft renders it useless for shipping.
Greenville	" 26	" 21	M.	M.	12·734	5,778	Good quality.
Wm. Belt	" 28	" 21	M.	M.	7·5	3,403	"
Warfield	" 24	" 20	M.	S.	19·05	8,642	"
Buster	" 28	" 20	M.	M.	14·97	6,791	"
Excelsior	" 20	" 6	M.	M.	1·578	716	Medium quality.
Parson Beauty	" 29	" 20	M.	M.	13·625	6,182	Good quality.
Sample	" 28	" 20	M.	M.	7·906	3,587	"
Pocomoke	" 27	" 19	M.	M.	13·875	6,295	"
Senator Dunlap	" 23	" 19	S.	M.	5·9375	2,694	"
Splendid	" 26	" 19	M.	M.	5·25	2,382	"
Beder Wood	" 22	" 19	M.	M.	9·34375	4,239	"
Miranda	" 29	" 21	S.	L.	28·375	12,875	Large coarse fruit, very soft, sour.
Bubach	" 29	" 17	S.	M.	8·047	3,651	Good quality.
Cordelia	" 28	" 21	M.	S.	18·5625	8,422	"
Desdemona	" 28	" 14	M.	M.	10·34375	4,693	"
Mariana	" 29	" 17	L.	M.	8·828	4,005	Medium quality.
Valeria	" 22	" 14	S.	M.	13·50	6,125	Good quality, very dark red, regular and sweet.
Ophelia	" 28	" 21	S.	L.	23·3125	10,578	Large, coarse, insipid and soft.
Lovett	" 29	" 20	M.	M.	11·875	5,388	Good quality.
Hermia	" 29	" 12	L.	S.	4·3125	1,956	Small fruit, poor quality.
Portia	" 29	" 20	S.	M.	18·4375	8,366	Excellent quality, regular and fine.
Julia	" 29	" 14	M.	S.	8·65625	3,927	Medium quality.
Bisel	" 29	" 20	M.	S.	21·3125	9,670	"
Glen Mary	" 28	" 14	L.	M.	3·3125	1,503	Good quality.

A new plantation was set out the spring of 1915, but the plants did not take very satisfactorily, and as a consequence it was found necessary to make the rows up again in August.

The following is a list of the varieties planted: Senator Dunlap, Howard No. 41, Buster, Chesapeake, Sample, Warfield, Wm. Belt, Haverland, Stevens Late Champion, Williams Improved, Three W's, Joe, Lovett Early, Glen Mary, Parson Beauty, Pocomoke, Superb, Americus and Progressive. The last three varieties are of the everbearing sorts.

VEGETABLES.

GARDEN PEAS.

Sixteen varieties of peas were sown, a good stand of each variety was obtained. The varieties were grown in rows 100 feet long, and from 50 feet of each row the green pods were picked. The remaining 50 feet was allowed to develop and ripen seed.

The following are the results of the test:—

Variety.	Date sown.	Ready for use.	lb. of green pods.	lb. of ripened seed.	Remarks.
Gregory Surprise	May 6.	July 10.	12·0	2·0	Good quality, shy bearer.
Thos. Laxton	" 6.	" 13.	21·0	7·0	Excellent quality.
Gradus	" 6.	" 13.	22·0	1·0	"
American Wonder	" 6	" 13.	17·0	2·0	Medium quality.
Stratagem.	" 6.	" 13.	9·5	1·5	"
Gradus	" 6.	" 15.	9·5	1·0	"
Early Giant	" 6.	" 17.	11·5	1·0	"
Premium Gem	" 6.	" 19.	16·5	3·5	Good quality.
Dainty Duchess	" 6	" 20.	27·0	1·0	"
Sutton Excelsior	" 6.	" 20.	35·0	3·0	"
Quite Content	" 6	" 21.	18·5	3·0	"
Telephone	" 6.	" 26.	17·5	3·0	"
Advancer	" 6.	" 29.	13·5	3·0	"
Heroine	" 6.	" 31.	36·0	4·0	"
Juno	" 6.	" 31.	21·0	4·0	"
Lincoln	" 6.	" 31.	19·0	3·0	"

BEANS.

Ten varieties of beans were sown in the garden in rows 50 feet long and 30 inches apart. All the varieties did very well, but were injured somewhat by bean anthracnose.

Variety.	Ready for use.	Quality.	Weight of green beans in pod.
			lb.
Red Valentine	August 14	Good	21·0
Extra Early Refugee	" 14	"	19·5
Extra Early Valentine	" 14	"	18·5
Wardwell Kidney Wax	" 14	"	14·0
Stringless Green Pod	" 14	"	12·5
Bountiful	" 17	"	16·0
Fordhook Favorite	" 17	Medium	8·5
Valentine	" 17	Good	8·0
Grennell Rustless Wax	" 17	Medium	7·0
Refugee Green Pod	" 17	"	3·0

RADISH.

The varieties of radish were planted the 7th of May and were ready for use the 15th of June.

The varieties are as follows and in order of merit: White Icicle, Searlet Turnip White Tipped and Rosy Gem.

LETTUCE.

Seven varieties were under test, the seed was sown in the garden the 6th of May.

All the varieties did well, but the two which were considered of superior quality are Grand Rapids, and Dreer All Heart.

LENNOXVILLE.

CELERY.

Five varieties of celery were under test. The seed was sown in flats in the hotbed the 5th of April, and the plants pricked out once, and on June 20 transplanted to the drills.

All the different varieties did well considering the condition of the soil.

Different methods of blanching were tried out, soil, boards and pliable material being used. It was found that the boards gave quicker and more uniform results for early market and that the resulting products was much cleaner. The pliable material gave similar results, but it was found that the plants should be twice as numerous in rows to give best results.

For the later varieties, the earth mound system in drilling up is much to be preferred to either of the former methods.

The varieties which did the best are as follows: Golden Self Blanching, White Plume and Evans Triumph.

CARROTS.

The season was very favourable for the carrot crop. Four varieties were sown in the garden May 18 in rows 30 feet long and 30 inches apart, and thinned to 1½ inches apart in the rows. They gave only medium results and are as follows:—

Variety.	Date of Sowing.	Ready for use.	Date of Harvest.	Weight.
				Lb.
Chantenay Half Long	May 18....	Sept. 1 ...	Oct. 28....	35
Improved Danvers Half Long	" 18....	" 1....	" 28....	25
Nantes Half Long Scarlet	" 18....	" 1....	" 28....	20
Early Scarlet Horn	" 18....	" 1....	" 28....	10

BEETS.

Six varieties of beets were sown May 16 in rows 30 feet long and 30 inches apart, and thinned to 2 inches apart in rows. All the varieties did well, but the following were considered to be of superior quality: Black Red Ball, Ruby Dulcet, and New Meteor.

Variety.	Date of Sowing.	Ready for Use.	Date of Harvest.	Weight.
				Lb.
Cardinal Globe	May 18....	July 28....	Oct. 30....	24
Eclipse	" 18....	" 28....	" 30....	21
Crosby Egyptian	" 18....	" 28....	" 30....	20
Ruby Dulcet	" 18....	" 28....	" 30....	20
Black Red Ball	" 18....	" 28....	" 30....	19
New Meteor	" 18....	" 28....	" 30....	17

One variety of beets, Early Model, was used in the cultural test. The seed was sown in one row 100 feet long May 18. The row was divided into three parts and the plants thinned to 2, 3, and 4 inches apart.

The results obtained proved beyond doubt that those thinned to 4 inches apart were more uniform and of much better quality.

PARSNIPS.

Two varieties of parsnips were tried out and very satisfactory results obtained. They are as follows and in order of merit: Vaughan Intermediate and Hollow Crown.

CUCUMBERS.

Seven varieties of cucumbers were started in flats in the hotbed, April 19, pricked out into pots and transplanted June 15. Three hills of each variety were planted 8 by 8 feet apart with three plants to the hill.

Variety.	Ready for use.	Size.	Quality.	Weight, in lb.
Davis Perfect	July 9	Medium	Good	74·5
Fordhook Famous	" 9	Large	Medium	58·0
Giant Pera	" 9	"	"	46·5
Peerless White Spine	" 9	Medium	Good	41·5
Prize Pickle	" 17	"	"	30·0
Cool & Crisp	" 28	"	"	36·0
Extra Early Russian	Aug. 13	Small	"	30·5

RHUBARB.

Rhubarb seed sown in the garden June 16 made good growth and was ready to be transplanted by August 21.

PEPPERS.

Four varieties of peppers were started in the hotbed April 10, pricked out and transplanted to the garden June 16.

The varieties were planted in rows 30 feet long and 30 inches apart, and the plants 18 inches apart in the row.

The following table will give the comparative results:—

Variety.	Ready for use.	Quality.	Weight in lb.
Long Red Cayenne	Sept. 10	Good	4·2
Red Chili	Oct. 4	"	4·0
Hot Bell	" 4	"	3·4
New Neapolitan	" 4	"	4·5

SWEDES FOR TABLE USE.

This crop was a total failure as a result of the prevalence of bacterial rot.

LEEK.

Two varieties were tested, to determine the most approved method of growing, as well as to ascertain the most desirable variety.

Seed was grown in the garden May 20 in rows 50 feet long and 12 inches apart, allowed to develop and later thinned to 3 inches apart in the row.

For comparison seed was sown in the flats in the hotbed April 10, pricked out, and on June 3 transplanted to the garden in rows similar to the former test.

Variety.	Where Started.	Date of Sowing.	Date of Harvest.	Weight.
				Lb.
English Flag	Garden	May 20	Oct. 21	8
English Flag	Hotbed	April 10	" 21	10
French Carentan	Garden	May 20	" 21	7
French Carentan	Hotbed	April 10	" 21	8

SALSIFY.

Only one variety was under test, "Long White," which variety gave a very good yield.

PARSLEY.

One variety was sown, "Double Curled," it made splendid growth during the season.

EGG PLANT.

The seed was sown in the hotbed April 10, pricked out May 1, and transplanted to the garden June 16. One row 30 feet long 20 plants, 18 inches apart in the row.

The variety used was Improved New York Spineless; three small sized fruits were obtained.

ONIONS.

Two varieties were used, Extra Early Red and Yellow Globe Danvers in the following experiments to ascertain the most approved method of growing onions.

Onions grown from seed sown May 17 in the open and thinned to 1, 2, and 3 inches apart, each variety was to be sown at the rate of 3 ounces per 50 feet in rows 100 feet long, 12 inches apart and treated as follows:—

33⅓ feet thinned to 1 inch apart.
33⅓ " " 2 "
33⅓ " " 3 "

It was found that in the case of both varieties the yield was larger from those thinned to 3 inches apart. Both varieties gave very satisfactory results.

LENNOXVILLE.

(2) Grown from young plants started in the hotbed and transplanted to the open ground after the danger of frost injury was past. The seed was sown in the hotbed April 12, pricked out the 28th of the same month and transplanted into rows 100 feet long, 12 inches apart and 3 inches apart in rows on June 9.

There was very little difference in the yield of these two varieties. However, the difference was in favour of the Extra Early Red.

It was noted that the onions grown from the seed sown in the open ground gave better results than those started in the hotbed and transplanted.

(3) Through an oversight the experiment with sets was not planted.

(4) Growing onion sets (two varieties). Yellow Globe Danvers and Large Red Wethersfield were used.

The seed was sown in the open May 7, in rows 100 feet long, 12 inches apart, at the rate of 200 seeds per foot. This work was a great success. Yellow Globe Danvers yielded 39 lbs. of small onions from the row of which fully 45 per cent were of the desired size, one-half to one-quarter inch in diameter. Large Red Wethersfield yielded 58 pounds of which 40 per cent were of the desired size.

(5) Control of the Onion Root Maggot (*Phorbia ceparum*). The onion root maggot did some damage to the crop but nothing serious. Carbolic emulsion and hellebore and water were applied; however, the results were negative with both preparations.

(6) Fall versus spring preparation of the soil was not tried.

(7) Onion seed was sown August 11, 1915, the results of which will be recorded later. Two varieties were used, Extra Early Red and Giant Prize Taker.

Variety Test.

Very satisfactory results were obtained from the eight varieties of onions in the variety test as per the following table. These were planted in rows 100 feet long, 12 inches apart, and 3 inches apart in the row.

Variety.	Colour.	Quality.	Weight.
			Lb.
Extra Early Red	Red	Good	33
Giant Red Wethersfield	"	"	30
Red Globe	"	"	27
White Globe	"	"	23
Yellow Globe Danvers	"	"	20
Dark Red Beauty	"	"	20
Yellow Globe	"	"	19
Red Wethersfield	"	"	17

CABBAGE.

Ten varieties of cabbage were tried in the variety test. The seed was sown in the hotbed April 10, pricked out May 18 and transplanted to the open ground June 2. Two fifty-foot rows of each variety were planted 30 inches apart and the plants 24 inches apart in the rows.

The plants used in this experiment were seriously damaged by cutworms, so that very unsatisfactory results were obtained from the test.

The following are the varieties: Early Jersey Wakefield, Paris Market, Danish Summer Ballhead, Nofalt, Fottler Improved Brunswick, Amager Danish Roundhead, Red Danish Stonehead and Red Danish Delicatesse.

LENNOXVILLE.

It was found that Paris Market was equal to Early Jersey Wakefield in quality and earliness. Some good heads were obtained from Flat Swedish, and the weight of five average heads was 10·5 pounds. Both varieties of red cabbage did well.

In the cultural test two varieties of cabbage were used. The seed was sown April 10, pricked out and planted June 2. Different methods were employed to control the root maggot, i.e.: (1) Tar felt paper discs; (2) cheesecloth protectors over each plant; (3) unprotected, as a check on the other two methods.

The results are as follows:—

Variety.	Quantity Planted.	Protector Used.	Result.	Weight of 10 average heads.
Early Jersey Wakefield	25	Tar Felt Disc	Good	40 lb.
" "	25	Cheese Cloth	Poor	No good heads.
" "	25	Unprotected	"	"
Copenhagen Market	25	Tar Felt Disc	Good	56 lb.
" "	25	Cheese Cloth	Poor	No good heads.
" "	25	Unprotected	"	"

CAULIFLOWER.

The variety test was seriously injured by cutworms, therefore, the results were not recorded.

Cultural Test.

Two varieties of cauliflower were sown in the hotbeds April 10, pricked out and transplanted June 25.

The value of tar-felt paper discs was well demonstrated in this experiment.

Variety.	Quantity Planted.	Protector used.	Result.	Weight of 1 average head.	Weight of 10 average heads.
				Lb.	Lb.
Early Snowball	25	Tar felt disc	Good	2	20
" "	25	Cheese Cloth	Poor	No good	heads.
" "	25	Unprotected	"	"	"
Early Dwarf Erfurt	25	Tar felt disc	Good	1·75	17·5
" "	25	Cheese Cloth	Poor	No good	heads.
" "	25	Unprotected	"	"	"

BRUSSELS SPROUTS.

One variety was used, "Dwarf Paris Market," a very good crop being obtained.

MUSKMELON.

The three varieties which gave best results were sown in flats in the hotbed April 9, pricked out into pots and planted in the garden in hills June 15.

The varieties which did the best are as follows, in order of merit: White Solid Net, Rocky Ford, Hackensack and Emerald Gem.

WATERMELON.

Four varieties were started in the hotbed April 9, pricked out into pots, and on June 15 were planted in hills in the garden. They are in order as follows: Cole Early, Improved Ice Cream and Earliest Ripe.

SQUASH.

Five varieties of squash were under test. The seed was sown April 14, in the hotbed, pricked out into pots and transplanted to the garden June 15, in hills of three, with the hills 8 feet apart. There were three hills of each variety.

Variety.	Ready for use.	Size.	Date harvested.	Yield from three hills in lb.
Long White Vegetable Marrow	Aug. 13	Large	Sept. 22	227
" Bush Marrow	" 13	"	" 22	194
Delicious	" 28	Medium	" 22	173
Golden Hubbard	" 13	"	" 22	113
Crookneck Summer	" 13	Small	" 22	39

PUMPKIN.

Three varieties were started in the hotbed April 19, pricked out into pots and planted June 15, in hills 8 feet apart with three plants to the hill.

Variety.	Ready for use.	Size.	Date harvested.	Yield from three hills in lb.
Jumbo	Aug. 13	Large	Sept. 22	432
Large Field	" 13	"	" 22	263
Sweet or Sugar	" 13	Small	" 22	257

CORN.

Nine varieties of table corn were under test. Some of these varieties gave better results than others, although they were grown on a uniform piece of soil and received the same treatment. The seed was planted May 28, in hills 3 by 3 feet apart, there being ninety-nine hills of each variety.

Variety.	Ready for use.	Quality.	Yield from 99 hills in dozen ears.	Estimated yield per acre in dozen ears.
Early Dawn	Aug. 29	Good	1·5	55
Golden Bantam	" 29	Excellent	17·5	651·5
Early Iowa	" 31	Good	1	36·6
Malakoff	Sept. 2	"	17	623·2
Fordhook Famous	" 4	"	9·5	348·3
Adams Early	" 12	Medium	24·5	899
Pocahontas	" 17	"	8·25	302·5
Perkins Extra Early Market	" 20	"	·50	18·3
Early Evergreen				

TOMATOES.

The season was quite favourable for the tomato crop. Thirteen varieties were under test. The seed was sown in the hotbeds April 10, pricked out, and transplanted June 10.

Five plants of each variety were planted 4 by 4 feet apart, and allowed to grow under ordinary field conditions. However, it was found that owing to the short quick growing season, the earlier varieties gave better results, and especially when trained to stakes or trellises.

Only the ripened fruits were harvested and weighed.

Variety.	Ready for use.	Quality.	Weight of ripe fruit in pounds.
Earliest on Earth (0 23–11)	Sept. 5	Medium	7·5
Alacrity X Dwarf Stone (0 23–54)	Aug. 24	"	24
Alacrity X Ponderosa	" 24	"	27
Alacrity 14–B	" 18	Fair	5·5
Alacrity 12–B	" 24	"	18·5
Jack Rose	" 24	"	2·5
Earliana Sunnybrook Strain	Sept. 5	Medium	5
Extra Early Wealthy	Aug. 24	Fair	1
Florida Special	Sept. 9	"	6
Prosperity	Aug. 18	Poor	4·5
Langdon Northern Adirondack No. 1	" 18	"	3·75
Chalk Early Jewel	Sept. 5	Medium	2
Round Scarlet Skin xxx Rennie Early	Aug. 18	"	9·5

Cultural Test of Tomatoes.

Comparison of culture of two varieties:—Sunnybrook Strain of Earliana and Bonny Best.

The seed was sown in the hotbeds April 10, germination between the 15th and 17th of the same month, pricked out, and planted to the open June 10. Twenty-five plants of each variety were used in each of the following tests, planted 24 by 30 inches apart.

1. Allowed to grow unpruned, lying on the ground.
2. Pruned to one stem.
2. Pruned to two stems.
(*a*) Tied to stakes.
(*b*) Tied to wires.
(*c*) Portion of foliage removed.
(*d*) Foliage left entire.

Variety.	How trained or Pruned.	Ready for use.	Quality.	Size of Fruit.	Weight in pounds.
Bonny Best	Pruned to 2 stems, on wires	Sept. 5	Medium	S.M.	12·5
Bonnybrook Str. Earliana	" 2 " "	Oct. 14	"	S.M.	16
Sunny Best	" 1 stem " foliage partly removed	Aug. 28	Excellent	M.L.	21
Sunnybrook Str. Earliana	" 1 " " "	" 7	"	M.L.	48
Bonny Best	" 1 " "	" 18	"	M.L.	76·25
Sunnybrook Str. Earliana	" 1 " "	" 7	"	M.L.	82·25
Bonny Best	" 2 stems on stakes	" 10	"	M.L.	24·50
Sunnybrook Str. Earliana	" 2 " "	" 7	"	M.L.	50·50
Bonny Best	" 1 stem " foliage partly removed	July 31	"	M.L.	76·50
Sunnybrook Str. Earliana	" 1 " " "	" 31	"	M.L.	79·25
Bonny Best	" 1 " "	Aug. 7	"	M.L.	70
Sunnybrook Str. Earliana	" 1 " "	July 31	"	M.L.	86
Bonny Best	Unpruned allowed to grow on ground	Sept. 5	Poor	S.M.	3·5
Sunnybrook Str. Earliana	" " " "	Oct. 14	"	S.M.	16

Various methods were tried in connection with ripening green tomatoes, and it was found that better results were obtained from an experiment with the green fruit left attached to the stems and placed in a moderately warm place.

POTATOES.

KIND OF SETS.

Two types of potatoes were used throughout in these experiments to ascertain, if possible, what influence the arrangement of the eyes and size of the sets might have on the yield, one type having strong buds from seed end to base.

Whole small potatoes of unmarketable size were planted in drills 30 inches apart in the rows; 66 sets were used in each case.

Whole, small potatoes.	Planted.	Marketable.	Unmarketable.	Total wt. from 66 hills.
		lb.	lb.	lb.
1a Strong buds at seed end	May 28	82·5	86	168·5
" from seed end to base	" 28	61·5	83·5	145

Lennoxville.

Sets were cut from medium to large potatoes which had been selected for the arrangement of eyes, to three sizes, 1, 2 and 3 eyes; 66 sets were used in each case, planted in drills 30 inches apart and one foot apart in the drills.

Sets, from medium to large potatoes, 1 eye.	Planted.	Marketable.	Unmarketable.	Total wt. from 66 hills.
		lb.	lb.	lb.
1b Strong buds from seed end to base	May 28..	49·5	42·5	92
" at seed end	" 28..	53·25	48	101·25
Sets, from medium to large potatoes, 2 eyes.				
1c Strong buds from seed end to base	" 28..	61·25	71	132·25
" at seed end	" 28..	78·5	51	129·5
Sets from medium to large potatoes, 3 eyes.				
1d Strong buds from seed end to base	" 28..	75	77	152
" at seed end	" 28..	74	68·75	142·75

The above tables indicate that the sets cut to 3 eyes gave slightly better results. This was also noticeable in the growth of tops. The plants were more vigorous.

Potatoes.—Selection Work.

The six varieties of potatoes used in connection with the hill selection work last year, were again selected this spring and 188 hills planted. At digging time 100 hills were selected from these 188 hills, and compared with 100 hills as they came from the rows in the multiplier plots. In every case there was a marked difference in favour of the selected hills.

Another variety was added to this selection work known as "Pride of the North". It is a red potato but is excellent for table purposes.

Variety.	Date of planting.	Date of Harvest.	100 selected hills.	Unselected.
			lb.	lb.
Empire State	May 29..	Oct. 8..	313	210
Carman No. 1	" 29..	" 8..	277	190
Green Mountain	" 29..	" 8..	262	198
Gold Coin	" 29..	" 8..	253	177
Irish Cobbler	" 29..	" 8..	205	183
Early Ohio (red)	" 29..	" 8..	212	160
Pride of the North (red)	" 29..	" 8..	313	210

The experiment dealing with the different distances of planting gave very interesting results as can be seen by examining the following tables. However, these data are obtained from but one year's work but were done in duplicate.

Green Mountain potatoes were used throughout. The seed was uniform and clean of scab, nevertheless all seed was previously treated with mercuric chloride, and when harvested the tubers were found to be perfectly clean.

Lennoxville.

DISTANCE of Planting.

66 sets planted 30" by 12" in each plot.	Date of Planting.	Date of Harvest.	Weight.
			lb.
4a Plot No. 1	May 29	Oct. 9	90·5
Plot No. 2	" 29	" 9	106·25
66 sets planted 30" by 14" in each plot.			
4b Plot No. 1	May 29	Oct. 9	88·5
Plot No. 2	" 29	" 9	96
66 sets planted 36" by 12" in each plot.			
4c Plot No. 1	May 29	Oct. 9	80·5
Plot No. 2	" 29	" 9	90·25
66 sets planted 36" by 14" in each plot.			
4d Plot No. 1	May 29	Oct. 9	100
Plot No. 2	" 29	" 9	123

KINDS OF CULTIVATION.

From the results obtained from the plots, it seems evident that three cultivations are preferable. To be more explicit, cultivate twice and let the hilling up act as the third cultivation.

Three cultivations.	Planted.	Harvested.	Total wt.
2a Plot No. 1	May 29	Oct. 9	117·5
Plot No. 2	" 29	" 9	113·5
Six cultivations.			
2b Plot No. 1	May 29	Oct. 9	111
Plot No. 2	" 29	" 9	105·75
Level cultivation.			
3a Plot No. 1	May 29	Oct. 9	99·5
Plot No. 2	" 29	" 9	110
Hilled after last cultivation.			
3b Plot No. 1	May 29	Oct. 9	93·75
Plot No. 2	" 29	" 9	79·25

In growing an acre of potatoes to ascertain the cost of production two varieties were used. Irish Cobbler for the early variety and Green Mountain for the late or main crop variety. One-half an acre of each was grown on a uniform piece of land.

Preparation of the soil.—Early in the fall of 1914 the land was ploughed and worked up so as to destroy weeds and prepare the soil to absorb and retain large amounts of moisture. During the winter a coat of green manure was applied, at the rate of 10 tons per acre. This manure was ploughed under as soon as the condition of the soil would permit its being worked without injuring its texture.

The double cutaway disc harrow was used twice to break up the soil, followed with the smoothing harrow.

Before planting, the roller was used to break the clods and make an even surface besides compacting the soil. The drills were made with an ordinary Lister plough 30 inches apart.

LENNOXVILLE.

Preparation of seed.—All seed used was previously treated in a solution of mercuric chloride, the solution being the strength of 1/1,000 (one part mercuric chloride in 1,000 parts of water.) As soon as the tubers were dry they were cut so that each tuber made four sets.

Planting.—The sets were planted in the drills 18 inches apart, and covered with the Lister plough. The planting was done on May 25 and 26. When the young plants began to peep through the ground, the light adjustable lever harrow was run over the field once to destroy the weeds and level down the land. This one horse cultivator was passed through four times, and hoeing done twice. Considerable trouble was experienced in controlling the Colorado potato beetles. However, they were finally brought under control without having done very serious damage to the foliage.

From the first to the last spray poisoned Bordeaux mixture was used, the usual 4-4-40 solution, with the addition of one pound of Paris green to every 40 gallons of solution.

The potatoes were dug between October 4 and 6. The total yield per acre of salable tubers was 254·80 bushels and 14 bushels of small unsaleable potatoes.

Both varieties did well considering that the land was in a very run down condition, and only a moderate coat of manure applied.

The following is the cost of growing the acre of potatoes and the net profit or returns:—

Rent of land at $3 per acre per year	$ 3 00
Cost of labour—	
(*a*) Two horses at 8 cents per hour per horse	11 68
(*b*) For manual labour at 17½ cents per hour	32 20
Cost of manure at $1 per ton	10 00
Cost of seed	16 41
Cost of spraying materials	4 72
Total cost	$ 78 01
RECEIPTS.	
Total value of saleable potatoes on acre at 60 cents per bushel	$ 152 88
Value of unsaleable potatoes at 15 cents per bushel	2 17
Total	$ 155 05
STATEMENT OF PROFIT AND LOSS.	
Total value of crop as above	$ 155 05
Total cost of production	78 01
Total net profit	$ 77 04
Net cost of producing one bushel of 60 pounds	Cents. 0 29

SEED PRODUCTION.

So that the necessary interest in the production of home-grown garden seed might be encouraged, an attempt was made to obtain some seed. Several blocks of tomatoes were planted in the garden for the purpose of securing a quantity of good smooth fruit from which to extract the seed. In October the fruit was harvested and seeds rubbed out on wire screens, washed and dried. This seed was used later on in the seed distribution work. Garden peas, Early Malcolm sweet corn and flower seeds of diverse kinds were collected, and of the latter it is a pleasure to report that a very high germination test was recorded. In fact all the seeds saved gave very high test, and it is a matter of vital importance to the farmers to try this work the coming season or make preparations for a year in advance.

LENNOXVILLE.

ORNAMENTAL GARDENING.

SWEET PEAS.

Sixty-one varieties of sweet peas were sown in the open May 10. The first bloom was recorded July 12 and from that date until the end of the season there was a splendid profusion and variety of bloom.

Although the results obtained were fairly satisfactory yet it is hoped that the coming year this work will be a greater success.

PERENNIALS.

The following is a list of the perennials that wintered well in the nursery rows, and produced an abundance of bloom throughout the season. Seed was saved from many of them which gave a high germination test.

Achillaea Ptarmica.
Bellis perennis.
Delphinium Hybrids.
" *chinense.*
Dianthus barbatus.
" *plumarius.*
Gypsophila paniculata.
Gaillardia.
Hesperis.
Linum perenne.
Lychnis chalcedonica.
" *Haageana.*
Lupinus.
Myosotis alpestris.
Pansy, (collections).
Physostegia virginica.
Pyrethrum hybridum.
Pentstemon barbatus.
Poppy, Iceland, new hybrids.
" " mixed.
" Orientale, Trilby, Psyche, and Mammoth.
Rudbeckia fulgida.
" *purpurea.*
Veronica spicata.

In addition to the foregoing list of perennials a new nursery was started. The seed was sown during July and the plants pricked out into the nursery rows during the first week in September. The plants became well established before the winter set in and it is hoped that a larger number of varieties will winter successfully.

BULBS.

Considerable attention was attracted by the show of bloom presented by the tulips. However, only a few varieties proved suitable for conditions here. This may not hold for every year, but may have been due to the exposed location of the beds.

The following varieties proved very satisfactory: Pottebakker White, Joost van Vondel, La Reine, Late Single Picotee, Cottage Maid, and Chrysolora.

The Darwin tulips, daffodils, and hyacinths, owing to winter injury, did not amount to anything.

TREES AND SHRUBS.

The nursery stock planted out the spring of 1914 consisting of deciduous trees, conifers and shrubs did very well. However, there were a few varieties that did not do very well, they had either been injured by drying out previous to planting or were too tender to stand the severe winter.

Some of the varieties that killed back during the winter sent up new growth again, but whether this wood will stand the winter is yet to be determined.

HEDGES.

So that a good idea could be got of the value of certain shrubs for hedge purposes, fifteen hedges were planted out in the spring of 1915. These hedges are to be kept clipped to demonstrate their value for ornament and for more practical purposes.

LENNOXVILLE.

They are as follows: *Rhamnus Frangula, Rhamnus cathartica, Picea alba* (native spruce), *Salix pentandra* (laurifolia), *Caragana arborescens, Larix europaea, Abies balsamea, Syringa Josikaea, Hydrangea paniculata grandiflora, Cornus alba, Thuya occidentalis, Ligustrum amurense, Caragana frutescens, Berberis Thunbergii, Thuya occidentalis Warcana.*

PHLOX.

Twenty-two varieties of hardy phlox were planted the first of October in nursery rows.

ANNUALS.

The following annuals were started in the hotbed between April 16 and 29. They were pricked out as soon as ready, and planted to the open May 12:—

Variety.	Number of Varieties.	Began to Bloom.	Bloom Over.
			Sept. 22
Aster	28	Aug. 13	Frost.
Antirrhinum	6	" 20	"
Arctotis grandis	1	July 12	"
Alonsoa	1	Aug. 16	"
Alyssum, (Little Dorrit)	1	" 1	"
Acroclinium, Double Rose	1	July 15	"
Abronia umbellata	1	" 30	"
Amaranthus	1	Aug. 10	"
Browallia elata	1	July 24	"
Balsam, Camellia Flowered	1	June 25	"
Candytuft	2	July 21	"
Carnation, Marguerite	1	Aug. 3	"
Coreopsis	1	June 25	"
Cockscomb	1	" 12	"
Celosia plumosa	1	July 17	"
Calendula	1	Aug. 1	"
Dahlia, Collarette			"
Dianthus Heddewigii	1	July 25	"
Dimorphotheca aurantiaca	1	" 9	"
Daisy, double	1		"
Gaillardia, double	1	" 19	"
Helichrysum	1	" 29	"
Ipomaea rubro cocrulea	1	" 8	"
Jacobaea, double	1		"
Lobelia	2		"
Marigold, single and double French	1	June 28	"
Mimulus	1	Aug. 2	"
Nicotiana affinis	1	July 4	"
Nemesia	6	June 26	"
Penstemon	1	Aug. 21	"
Petunia	3	June 21	"
Phlox Drummondii	7	July 4	"
Pansy	5	June 23	"
Ricinus communis major	1	July 30	"
Salvia	2	Aug. 16	"
Salpiglossis	1	July 15	"
Scabious	1	Aug. 11	"
Schizanthus grandiflora Hybrids	1	" 3	"
Stocks, Ten Weeks	7	July 9	"
Tagetes	1	June 20	"
Verbena	3	" 2	"
Zinnia	2	" 19	"

LENNOXVILLE.

The annuals sown in the open ground did not amount to much as a result of insect injury. The following few varieties were not attacked and did very well:—

Variety.	Number of Varieties.	Date of Sowing.	Began to Bloom.	Bloom Over.
				Sept. 22
Calendula officinalis	2	May 21	July 29	Frost.
Candytuft	2	" 21	" 15	"
Cornflowers, mixed	1	" 21	" 16	"
Larkspur	3	" 21	" 12	"
Lavatera, pink	1	" 21	Aug. 11	"
Mignonette	1	" 21	July 27	"
Nasturtium	2	" 21	" 30	"
Portulaca	1	" 21	Aug. 2	"
Sweet Sultan	1	" 21	July 21	"

EXPERIMENTAL FARM, BRANDON, MAN.

REPORT OF THE SUPERINTENDENT, W. C. McKILLICAN, B.S.A.

In presenting the following report on the horticultural work at the Brandon Experimental Farm for the year 1915-16, credit must be given to the Assistant in Horticulture, Mr. S. A. Bjarnason, B.A., B.S.A., who did much of the work of taking notes and who has compiled the results presented herewith.

The season opened early, and April was a fine warm month favourable for early work. This was followed by cold weather and repeated severe frosts during May and June and cool weather even in July. During this same period and in August, the rainfall was much below normal. The season was, therefore, a very trying one for horticultural products, much damage being done by frosts, and crops that were not actually damaged were delayed and reduced in productiveness. Unusually early fall frosts, beginning with a sharp frost on August 23, completed a series of untoward conditions that made the season as a whole the most unfavourable in years.

VEGETABLES.

Onions, parsnips, lettuce, peas, carrots, parsley, spinach, radish and early potatoes were sown during the latter part of April and the early part of May. The succeeding dry weather and frequent frosts kept these in check to a great extent so the advantage of early sowing was greatly minimized. Everything was progressing favourably until the night-frosts late in August destroyed all tender stuff and froze the vines of the potatoes and tomatoes. Corn, beans and cucurbitaceous plants were totally destroyed. Hardy garden stuff did not suffer, and ripened very satisfactorily.

POTATOES.

Twenty varieties of potatoes were tested this year. Two 66-foot rows of each variety were grown, and the yield per acre was computed from the yield obtained from these. In order to give a better idea of the average yield of each variety, 5-year, 4-year, 3-year, and 2-year averages are also given below. The yield in 1915 was as follows:—

Potatoes—Test of Varieties.

Variety.	Shape.	Size.	Colour.	Average Earliness.	Yield per Acre, 1915.				Total.	
					Marketable.		Not Marketable.			
					Bush.	lb.	Bush.	lb.	Bush.	lb.
Hamilton Early	Round	Large	White	Early	421	36	24	..	445	36
Gold Coin	Oblong to oval	Large	White	Late	430	48	12	48	443	36
Early Norther	Long	Large	Red	Early	412	30	25	36	438	06
Early Bovee	Long-flat	Large	Red-pink	Early	368	30	38	30	407	..
Woodbury White Rose	Long	Large	White	Medium	379	30	22	..	401	30
Early Ohio	Long	Medium	Red	Early	357	30	27	30	385	..
Houlton Rose	Long-flat	Large	Red	Early	359	18	25	42	385	..
Manitoba Wonder	Long	Medium	Red	Medium	353	48	25	36	379	24
Reeves Rose	Long	Medium	Pink	Medium	359	18	14	36	373	54
American Wonder	Long	Medium	White	Medium	350	06	20	06	370	12
Table Talk	Long-flat	Large	White	Late	311	36	25	36	337	12
Early White Prize	Long	Medium	White	Early	319	..	17	30	336	30
Wee McGregor	Long-flat	Medium	White	Late to Medium	298	48	29	18	328	06
Peacock Surprise	Long	Medium	Russet	Medium	286	..	38	30	324	30
Rawlings Kidney	Long	Medium	White	Late	251	06	36	36	287	42
Early Snowdrop	Long-flat	Medium	White	Early	254	48	16	30	271	18
Irish Cobbler (C.E.F. Seed)	Round	Medium	White	Medium Early	144	48	12	48	157	36
Ashleaf Kidney	Long	Small	White	Medium	73	18	5	30	78	48
Vick Extra Early	Long	Small	White		49	30	16	30	66	..
Late Puritan	Long	Small	White		..	..	25	36	25	36

VARIETY TESTS—Potatoes.

Variety.	Yield per Acre. 5-Year Average.	
	Bush.	lb.
Table Talk	532	23
Woodbury White Rose	507	23
Rawlings Kidney	477	05
Early Ohio	449	58
American Wonder	448	35
Reeves Rose	448	32
Manitoba Wonder	433	02
Hamilton Early	429	56
Early Bovee	429	55
Peacock Surprise	413	58
Early White Prize	405	22
Irish Cobbler	395	04
Gold Coin	378	49
Late Puritan	365	14

Variety.	Yield per Acre. 4-Year Average.	
	Bush.	lb.
Wee McGregor	441	39

Variety.	Yield per Acre. 3-Year Average.	
	Bush.	lb.
Early Norther	411	52
Houlton Rose	376	50

Variety.	Yield per Acre. 2-Year Average.	
	Bush.	lb.
Early Snowdrop	245	39
Ashleaf Kidney (English Type)	137	46

CULTURAL AND OTHER EXPERIMENTS WITH POTATOES.

(a) *Storing Test.*—In order to determine the keeping qualities of the different sorts, twenty-two varieties were stored during the winter of 1914-15. The temperature in the cellar was rather high, averaging perhaps 40° to 45° F. at least. This, combined with the dry atmosphere, made the test quite a severe one. In the table

below, Group I includes those that remained firm and had few or no sprouts. Group II includes those that were firm or medium firm with medium or long sprouts, while Group III is made up of those that were soft and had long sprouts. The test was concluded on May 5, 1915.

Group I.	Group II.	Group III.
Peacock Surprise	Irish Cobbler	Early Ohio.
Early Norther	Gold Coin	Vick Extra Early.
American Wonder	Ashleaf Kidney	Reeves Rose.
Rawlings Kidney	Lightning	Empire State.
Late Puritan	Wee McGregor	Manitoba Wonder.
Houlton Rose	Early Bovee	
	Table Talk	
	Early Snowdrop	
	Hamilton Early	
	Early White Prize	
	Woodbury White Rose	

(b) *Hilled vs. Level Cultivation.*—On heavy clay loam such as is found in the vegetable gardens, the hilled cultivation has given somewhat better results this year.

(c) *Planting on Different Dates.*—Potatoes were planted on the following dates: May 1, May 14, May 28, and June 4. The variety used was Early Bovee. The result shows that the plot planted on the second date gave the best returns, while the one planted on May 1 came next. Those planted on June 4 were much poorer, and had not reached the stage of maturity when cut back by frost, late in August.

(d) *Three Cultivations versus Six cultivations.*—In a climate where the rainfall is limited, keeping the soil in good tilth helps materially in conserving moisture. In order to show the beneficial results of repeated cultivation, two adjacent plots one-twentieth acre each, were planted to the same variety (Peacock Surprise). The only difference in treatment was in the number of cultivations:—

—	Planted.	Dates of Cultivation.	When Dug.	Yield per Acre. (Bush.)		
				Marketable.	Unmarketable.	Total.
For 3 cultivations	May 27	June 30, July 20, Aug. 9	Sept. 10	139·6	19·00	158·6
For 6 cultivations	" 27	June 30, July 10, 20, 30; Aug. 9 and 19	" 10	164·66	23·33	188·0

(e) Test of the earliness of varieties:—

Variety.	When Planted.	Appeared Above Ground.	Ready for Use.
Early Norther	May 1	May 29	July 8
Hamilton Early	" 1	" 29	" 10
Early White Prize	" 1	" 29	" 10
Early Bovee	" 1	" 29	" 12
Irish Cobbler	" 1	June 2	" 14
Houlton Rose	" 1	May 29	" 15
Early Ohio	" 1	" 29	" 20
Wee McGregor	" 1	" 31	" 30
Peacock Surprise	" 1	" 31	Aug. 10

(f) The experiments on "Different Methods of Cutting" did not give any positive results this year—and the same is true of those "Planted Different Distances Apart."

(g) A system of selection in order to secure "Elite Stock" seed, was carried out again this year. The potatoes selected from the best individual hills last year, were planted whole in continuous rows—each group being separated from the next by an intervening space in the row. Four varieties were used, viz.: *Table Talk, Wee McGregor, Early White Prize,* and *Early Ohio.* The best groups of hills are being kept for 1916 seed.

(h) *Cost of Production of One-half Acre of Crop.*—A quarter acre each of an early and late variety were planted side by side in the spring and a record kept of all the work done throughout the season. The result is given below.

POTATOES—Cost of Production.

	Bushels Marketable.	Bushels non-marketable.	Total Bushels.	Value of Seed = $1.00 per bushel.	Cost of Cutting and Planting.	Cost of Harrowing and Cultivating.	Cost of Spraying.	Cost of Harvesting.	Total Cost.	Value of Marketable Tubers = 50c per bush.	Value of non-Marketable Tubers at $3.00 per ton.	Total Value.	Net Profit per acre.
				$	$	$	$	$	$	$	$	$	$
¼ Acre Table Talk	40 15	5·816	45·966										
¼ Acre Early Bovee	49·78	7·016	56·796										
Total for ¼ Acre	89·93	12·832	102·762	10 30	6 80	1 06	3 30	19 45	40 91	89 93	2 31	92 24	10 42
Total for one Acre	179·86	25·66	205·52	20 60	13 60	2 12	6 60	38 90	81 82				

Value of manual labour, 19½ cents per hour.
Value of horse labour, 7 cents per hour per horse.
Value of poison spray (Paris green), 40 cents per pound.

Distribution of Seed Potatoes.

Some 519 samples of seed potatoes were sent to Manitoba farmers who applied for them.

Cooking Test.

A cooking test of potatoes was again carried out. This year they were baked instead of boiled. The following are the results:—

BRANDON.

POTATOES.—Cooking Test.

Variety.	Smoothness, etc.	Flavour.	Texture.	Dryness.	Remarks.
Early Snowdrop	Smooth, shallow eyes	Good	Fine	Fairly dry	Yellowish flesh.
Rawlings Kidney	Smooth, shallow eyes	Good	Fine	Dry	White flesh.
Reeves Rose	Fairly smooth, fairly shallow eyes	Good	Fairly fine	Fairly dry	Yellow flesh.
Early Bovee	Smooth, shallow eyes	Good	Fine	Very dry	White flesh.
Early White Prize	Smooth, shallow eyes	Good	Fine	Dry	White flesh.
Irish Cobbler	Smooth, fairly shallow eyes	Good	Fine	Fairly dry	White flesh.
Wee McGregor	Smooth, fairly shallow eyes	Good	Fine	Rather moist	
Early Ohio	Fairly smooth, fairly shallow eyes	Good	Fine	Rather moist	Dark flesh.
Manitoba Wonder	Fairly smooth, fairly shallow eyes	Good	Fairly fine	Dry	
Woodbury White Rose	Fairly shallow eyes	Good	Fairly fine	Fairly dry	White flesh, cooks quickly
Early Norther	Fairly smooth, deep eyes	Good	Fine	Dry	White flesh.
Houlton Rose	Somewhat rough, deep eyes	Good	Fine	Dry	White flesh.
Hamilton Early	Smooth, shallow eyes	Good	Fine	Dry	White flesh.
Vick Extra Early	Smooth, shallow eyes	Medium	Fine	Very moist	Yellow flesh.
Table Talk	Smooth, very shallow eyes	Medium	Coarse	Moist	
Gold Coin	Smooth, rather deep eyes	Medium	Medium	Moist	
Peacock Surprise	Smooth very shallow eyes	Medium	Fine	Very moist	

ASPARAGUS.

The asparagus bed again yielded a good crop of this early vegetable. The bed is given very little care during the summer, but the tops are removed from the plants, and a mulch of manure applied in the fall. On account of its earliness and ease of handling, asparagus should have a place in every farmer's garden. It was ready for use on April 30. The season lasted until May 30.

BEANS.

Eight varieties of beans were grown, but owing to early frosts, no results were obtained. The cultural experiment was also spoiled.

BEETS.

There were some good yields in beets this year. The seed was sown on May 18, and the crop harvested on September 10.

BEETS

Variety.	Date of Germination.	Yield per Acre.		Shape and size.	Cooking Test.		
					Flavour.	Texture.	Colour.
		Bush.	lb.				
Ruby Dulcet	May 31	1097	..	Oval, rough, large	Good	Rather coarse	Pale with light rings.
Crosby Egyptian	" 31	1080	54	Flat, uniform	Good	Fairly good	Deep colour.
Eclipse	June 14	984	06	Globular, rough looking	Good	Rather coarse	Pale and uneven.
Extra Early Blood	" 14	968	..	Flat to globular	Good	Tender, coarse	Light coloured rings.
Early Black Red Ball	" 14	903	30	Flat to globular	Good	Free from fibre, fine and tender	Dark, even colour.
Cardinal Globe	" 12	847	..	Irregular and not uniform	Good	Coarse and fibrous	Colour very uneven.
Selected Early Blood Turnip	" 14	838	54	Globular, smooth	Good	Fine and tender	Dark colour.
New Meteor	" 14	548	30	Globular, smooth, rather small	Good	Fine, free from fibre	Good colour.

Cultural Test.—An experiment was carried out to determine the best distance apart for beets. Three 66-foot rows, 18 inches apart, were thinned to 2 inches, 3 inches and 4 inches apart in the row, respectively. The result showed that the smallest distance gave the most uniform roots for table use.

Variety.	Pounds from 66 ft row.	Bushels per acre.	Remarks.
Thinned 2 inches apart.....	137·0	1004·6	Few large. Mostly small, medium to small.
" 3 " "	140·5	1030·3	A few large. Mostly medium, not uniform.
" 4 " "	143·0	1048·6	About 50% were large, the rest medium.

The most uniform root for table use is obtained by thinning to 2 inches apart in the row. The larger distance gives more large, less desirable roots, and altogether more waste, even if the yield per acre is somewhat higher.

BRUSSELS SPROUTS.

One variety, the Dwarf Improved, was grown. The seed was sown on April 3, and planted out on May 25. The growth was strong enough but there was no "heart,"—the buds being too open.

CABBAGE.

This season was a good one for cabbages. The crop was good and entirely uninjured, except for an attack of the cabbage butterfly, which was quickly controlled by pyrethrum powder. The following table gives the results obtained:—

CABBAGE.—Test of Varieties

Variety.	Date Sown.	Date planted out.	Ready for use.	Weight of 10 average Heads. (Trimmed for market).	Cooking Test.	
					Flavour.	Texture.
				lb.		
Paris Market Early..	April. 5	May 25	July 19	40	Good.....	Very tender.
Early Jersey Wakefield.....	" 5	" 25	" 22	36	Very good.....	Very tender.
Copenhagen Market..	" 5	" 25	" 30	81	"	Very tender (heads very firm.)
Nofalt.....	" 5	" 25	" 6	100	Rather strong...	Tender.
Glory of Enkhuisen.	" 5	" 25	Aug. 6	91	.....	.....
Northern Favorite...	" 5	" 25	" 10	54·5	Good medium..	Tender.
Kildonaa.....	" 5	" 25	" 14	69	Fine, mild. ..	Very tender (good firm heads).
Flat Swedish.....	" 5	" 25	" 29	64·5	Rather strong...	Medium tender.
Fottler Improved Brunswick.	" 5	" 25	Sept. 1	61	Medium strong.	Tender (open loose heads).
Danish Summer Ballhead.....	" 5	" 25	" 10	48	Good medium..	Tender.

CAULIFLOWER.

The cauliflower made excellent growth. Two varieties were sown on April 5 and planted out on May 25.

The varieties tested were: Early Snowball, and Extra Selected Dwarf Erfurt. The former was ready for use on July 29 and yielded 25 good heads (100 per cent). The latter was slightly earlier but smaller, and yielded 23 good heads out of a total of 25 (92 per cent). Both are tender and of a good flavour, although the Erfurt is a little strong.

CARROTS.

Five varieties of carrots were sown in the open, on June 4. All gave good results, the best being Half Long Chantenay and Improved Danvers Half Long. The cooking test showed all varieties to be of a good flavour, and very tender.

Cultural Test.—A thinning experiment was also carried on with the carrots. Rows were 18 inches apart, and the plants were thinned to distances of 1½, 2 and 3 inches apart.

Distance Apart.	Lb. from 66'row	Bush. per acre.	Remarks.
1½" apart in row.....	113·5	832	Medium size, fairly uniform.
2" apart in row.....	126	924	Large to medium, uniform.
3" "	119	872·6	Large and large-medium. Very few small.

The most uniform medium-sized roots were obtained from those thinned to 1½ inches and 2 inches apart, with the balance considerably in favour of the latter.

CELERY.

Celery again proved to be a failure. Seven varieties were tried, but none of these reached a stage where bleaching could be started. Except in very favourable seasons, celery will not make good growth without artificial watering, a practice which is not being carried out on this Farm. White Plume and Noll Magnificent seem to be the strongest growers.

Cucumbers, citrons, musk melons and watermelons were tried, but all froze on August 24. The exceptionally early frost destroyed what would have been a very good crop of all these vegetables.

CORN.

Eleven varieties of corn were planted on May 27, and produced good growth. The total destruction of the crop on August 24 made any experimental results impossible. This year is therefore an exception, as corn has proven to be a very desirable crop in previous years.

LEEKS.

French Carentan, and English Flag were the two varieties tested. The former gave a considerably better yield. Neither did very well, and many of the plants died after being transplanted, on account of the dry weather.

BRANDON.

LETTUCE.

The lettuce did well this year. Ten varieties were tested for yield, earliness, length of season and quality. The results are as follows:—

Variety.	Ready for Use.	End of Season.	Weight of 10 average Heads.		Table Quality.	
					Flavour.	Texture.
			Lb.	oz.		
Dreer All Heart	July 5	August 6	6	8	Flat	Very fine, crimped.
May King	" 5	" 9	4	12	Good	Fine, crimped.
All Year Round	" 6	" 2	5		Good	Fine.
Giant Crystal Head	" 10	" 8	14	..	Good	Crisp and fine.
Iceberg	" 10	" 8	12	..	Good	Very crisp and tender.
Cos Trianon	" 12	" 10	20	..	Good	Very crisp and tender.
Grand Rapids	" 12	" 10	7	8	Fair, rather strong	Fine, but not crisp.
Improved Hanson	" 13	" 1	11	8	Good	Crisp, fine.
Denver Market	" 13	" 6	9		Good	Crisp, fine.
Favorite	" 15	" 8	7	8	Good	Crisp, fine.

ONIONS.

The crop of onions was good. Besides the test of varieties, several cultural tests were carried out, the results of which are tabulated below. In the variety tests, the "Globe" varieties were the best yielders.

VARIETY TEST.—Onions.

Name of variety.	Date of Sowing.	Date of Pulling.	Size.	Shape.	Colour.	Yield from 30 foot Row.	
						Lb.	oz.
Yellow Globe	April 21	Sept. 7	Large	Globular	Yellow	25	8
Red Globe	" 21	" 7	Large	Globular	Red	24	..
White Globe	" 21	" 7	Large	Globular	White	23	8
White Queen	" 21	" 7	Large	Flat	White	22	8
Danvers Yellow Globe	" 21	" 7	Medium	Globular	Yellow	21	8
Extra Early Red	" 21	" 7	Large	Flat	Red	20	8
Red Wethersfield	" 21	" 7	Large	Flat	Red	19	..
Very White Pearl	" 21	" 7	Large	Flat (thick)	White	18	..
Early White Barletta	" 21	" 7	Medium	Flat	White	15	..
Ailsa Craig	" 21	" 7	Medium to small	Globular	Light yellow	11	8

(a) *Cultural Tests.*—To test relative merit of starting onions in hotbeds as compared with sowing in open. The seed sown in hotbeds was sown on March 29 and the plants were set out May 25. The outside seeding was done on April 21. The results with three different varieties were as follows:—

Variety.	Yield from 30 foot Row. Sown in hot-bed and transplanted.		Yield from 30-foot Row sown outside.	
	lb.	oz.	lb.	oz.
Danvers Yellow Globe	12	..	21	8
Extra Early Red	19	8	20	8
Large Red Wethersfield	7	4	19	..

In addition to yielding better, the outside sowing required much less work.

BRANDON.

(b) *Thinning experiment.*—The same three varieties were used for this experiment. The rows were 18 inches apart. Sowing was done on April 21.

Variety.	Yield from 30-foot Row.		
	lb.	oz.	
Danvers Yellow Globe.			
Thinned to 1" apart.	22	12	No very great difference in size, but those thinned 3 inches apart were more uniform in size.
" 2" "	16	12	
" 3" "	13	..	
Extra Early Red.			
Thinned to 1" apart.	21	12	
" 2" "	12	12	
" 3" "	9	..	No very great difference in size, but those thinned 3 inches apart were more uniform in size.
Large Red Wethersfield.			
Thinned to 1" apart.	18	8	Many small, a few large and medium
" 2" "	13	..	
" 3" "	16	4	Uniformly large to medium.

(c) *Small versus Large Sets.*—A 30-foot row of small sets yielded 25 pounds while the large sets yielded 31 pounds.

(d) *Growing Onion Sets.*—Seed was sown at the rate of 200 seeds per lineal foot. The resulting crop was harvested on September 7. The bulbs were small and well suited for sets.

(e) A few rows (22 feet each) of Multiplier onions were planted on November 6, just before snow fell. An equal number will be planted beside these in the spring of 1916. The object is to find the relative merits of fall and spring planting.

PARSLEY.

One 66-foot row of Double Curled parsley was grown, and gave an average yield.

PARSNIPS.

The yield of parsnips was light. Of the three varieties tested, the New Intermediate, while the lightest yielder, gave the highest percentage of marketable roots. Hollow Crown gave the highest yield. Both were of good flavour and free from fibre.

Cultural Test.—Three rows of Hollow Crown were sown 30 inches apart and the roots thinned out to 2, 3 and 4 inches apart. The result is as follows:—

	Yield. Bush. per acre.	Yield of Marketable Roots. Bush. per acre.	
Hollow Crown.			
Thinned 2" apart.	250·8	154	Small to small medium. Not uniform.
" 3" "	246·4	160	Medium, fairly uniform.
" 4" "	246·4	165	Medium; few large; fairly uniform.

PEAS.

The peas have proven very satisfactory. They were not injured by the spring frosts and had matured well before the date of the frost which proved disastrous to the beans and other tender garden stuff, late in August.

Twenty-one varieties were tested, with the following results:—

BRANDON.

Peas—Test of Varieties.

Variety.	Date Sown.	Date Ready for Use.	Length of Pod.	No. of Peas in Pod.	Height of Vine	Yield 15-ft. row. (Ripe but not threshed.)	Cooking Test.
			Feet.		Ft. In.	Lb.	
Early Pilot	May 3	July 10	3	6	9	2½	Good flavor, tender.
Gregory Surprise	" 3	" 14	2¾	6	3 6	3½	
Thomas Laxton	" 3	" 24	3½	7	4 5	3½	Excellent flavor, very tender.
Early Giant	" 3	" 24	4½	7	4 2	3½	Medium flavor, fairly tender.
Sutton Excelsior	" 3	" 26	3½	7	2 6	4¼	Very good flavor, very tender.
Western Beauty	" 3	" 26	3¼	7	2 3	4	Medium flavor, tender; pods well filled.
Premium Gem	" 3	" 28	3	9	2 ..	4¼	Very good flavor, tender.
American Wonder	" 3	" 28	3⅜	7	2 2	3½	Very good flavor, tender.
Gradus	" 3	" 29	4	7	4 7	2¾	Very good flavor, very tender; pods large, and irregularly filled.
English Wonder	" 3	" 29	3	8	2 4	3½	Good flavor, rather dry. (Small, well-filled pods.)
Rivenhall Wonder	" 3	" 30	3½	7	2 2	3½	Fairly good flavor. Fairly tender. Dry.
Dainty Duchess	" 3	" 31	4⅛	9	6 2	5	Good flavor; rather dry.
Reliance	" 3	Aug. 2	4½	9	2 10	4½	Very good; very tender; large; well-filled pods.
Telephone	" 3	" 3	4¼	7	4 9	4½	Very good flavor, tender. Large peas.
Lincoln	" 3	" 3	3¾	8	2 10	4½	Very good flavor; very tender.
Quite Content	" 3	" 3	4⅝	9	5 4	4	Medium flavor; dry. Large peas.
Advancer	" 3	" 3	3¼	6	4 ..	4½	Excellent flavor; very tender; peas small.
Juno	" 3	" 3	3½	8	2 8	5	Fairly good. Rather too ripe.
Rent Payer	" 3	" 3	4	8	2 10	4¼	Fairly good. Fairly tender but dry.
Heroine	" 3	" 4	4⅜	8	3 4	5	Good flavor; tender but rather dry.
Stratagem	" 3	" 5	4⅞	8	3 9	3¼	Good flavor, fairly tender but dry.

Cultural Tests.—With a view to finding out whether sowing one variety on successive dates, is as good as sowing varieties which are ready for use on successive dates if sown at the same time, the varieties Gradus, Advancer, Stratagem and Thos. Laxton were sown on May 4. Later, on May 11, 18 and 25, respectively, an additional row of Thos. Laxton was sown.

PEAS—Cultural Test.

	Date sown.	Yield of Green Peas, 25 ft Row.						Yield of ripe peas from 25-ft. Row (Threshed)		Total. Yield 50-ft.	
		First Picking.			Second Picking.						
		Date.	lb.	oz.	Date.	lb.	oz.	Lb.	oz.	lb.	oz.
Gradus	May 4	July 28	5	..	Aug. 3	2	4	2	6	9	10
Advancer	" 4	" 30	4	..	" 3	3	8	4	4	11	12
Stratagem	" 4	Aug. 10	5	..	.....	0	0	4	12	9	12
Thos. Laxton	" 4	July 26	4	4	Aug. 3	1	9	3	..	8	13
"	" 11	Aug. 3	4	..	" 8	0	12	2	12	7	8
"	" 18	" 6	3	7	.....	0	0	2	..	5	7
"	" 25	" 8	1	5	.....	0	0	1	6	2	11

The above table shows that both in length of season and in yield of peas, the sowing of four varieties varying in season from very early to late, gave better results than successive sowings of one early variety.

Home-grown Seed.—Home-grown seed of two varieties of peas was sown in a comparative test with purchased seed. In both cases earlier development of the former was the result. With American Wonder, home-grown seed produced peas ready for use on July 23 as compared with July 28 for the purchased seed. With Reliance, July 30 and August 2 were the dates on which the peas were ready, the earlier dates being those from the home-grown seed. Yield and quality appeared to be equal from both sources of seed.

PUMPKINS, MARROWS, SQUASHES.

Pumpkins, marrows, and squashes were sown on June 9, and made very favourable progress until August 24 when the whole crop was damaged by frost. Succeeding frosts killed the vines entirely. There are therefore, no experimental data on these vegetables for this season.

RADISH.

One variety of radish was sown on April 27. The leaves were touched by late spring frosts, but the yield was a good average. No attempt was made at successive sowings.

RHUBARB.

A new bed of rhubarb was started in 1914. The earliness was noted and tests made of the quality, with the following results:—

Variety.	Ready for Use.	Cooking Qualities.	
		Flavour.	Texture.
Linnaeus	April 30	Good	Tender.
Prima Donna	May 4	Medium	Coarse.
Victoria	" 7	Very good	Tender, rich colour.
Cyclops	" 12	Fairly good	Rather coarse.
Paragon	" 17	Rather poor	Coarse.
Early Raspberry	" 25	Good	Fairly tender.
Hobday Giant	" 25	Fair	Tender.
Monarque	" 25	.....	.....
Daw Champion	June 20	Fairly good	Rather coarse.

SALSIFY.

Two 66-foot rows of salsify were grown, but the crop was not very good. The roots were very prongy and small.

SPINACH

A good medium yield of Bloomsdale was realized. It was fit for use from June 20 to July 7.

TOMATOES.

The tests with tomatoes were very unsatisfactory, as the frost caught them just when the medium-early varieties were beginning to ripen. The earliest ripe was the Alacrity 14B, which had ripe fruit on August 16. Alacrity 12B was first ripe on August 21. The season was much later than 1914, when the majority of the varieties ripened fruit on July 25 to July 30. The heaviest yields of green fruit were from Extra Early Wealthy, Earliest of All, XXX Early, and Chalk Early Jewel.

Cultural Test.—A test was undertaken in regard to methods of pruning tomatoes, but owing to the late development of the fruit on account of the cold season, and its injury by late frosts, no results of value were obtained.

Ripening test of Tomatoes.—Twenty sound specimens of each of two varieties were ripened under different conditions. Group I was placed in direct sunlight in a window facing south. Group II was placed on a floor in a dim corner of the room where no direct daylight could reach the fruit. Group III was placed in air-tight paper bags in a dark cupboard in the same room. Group IV was placed in a box on the basement floor, where no light reached the fruit and where the atmosphere was somewhat damper than in the room containing the other groups.

Each group was subdivided into (*a*) slightly blushed specimens, and (*b*) totally green specimens, but the relative merits of the different methods used showed equally well on both (*a*) and (*b*). Each group is therefore reported without any subdivision:—

Groups.	Temperatures. Fahrenheit.	Results observed.
Group I. Placed in direct sunlight in a window	Minimum 50°.... Maximum 66°... Average 55·6°...	This was the quickest ripening group (both "blushed" and "green" specimens) 40% of fruit was soft.
Group II. in dim corner in room.....	Minimum 50°.... Maximum 66°... Average 56°.....	Took longer to ripen, but showed only 17% of soft fruit.
Group III. in air-tight light proof bags.....	Minimum 49·5°. Maximum 69°... Average 56·3°...	This method is good, especially for *perfectly sound, green fruit*, as it takes long to ripen and can be kept a long time. Of the "blushed" specimens used, only 50% came through in good condition. The fruit ripens slower (by a few days) than that in Groups I and II.
Group IV. in box in dark, on basement floor.	Minimum 50°.... Maximum 64°.... Average 56°.....	Practically 100% of the fruit came through the test in good condition. Period of ripening about the same as for Group III.

TURNIPS.

Seven varieties of turnips were tested. These were all swedes (Ruta Baga) and made good growth for table use. The growth was not rank, but quite healthy. About the smoothest and most uniform were Hall Westerbury, Favorite and Bangholm Purple Top, while the heaviest yielders were Skirving Purple Top and Sutton Champion.

FRUITS.

APPLES.

A good crop of cross-bred and seedling crab apples was harvested and was sold for preserving and jelly making. The most productive and hardiest trees are Dr. Saunders' cross-breds and seedlings of the same. The best tree of this type, a seedling from Cluster, has been given the name of Bedford, in honour of the first superintendent of this Farm, Mr. S. A. Bedford. This tree is perfectly hardy, has produced abundantly every season for the last four years, and bears a crab apple of reasonably good size, fine appearance and first rate quality. This apple should be of value and it is proposed to propagate from it. Others of Saunders' hybrids and seedlings that are doing well are: Gertrude, Seedling of Tony, Columbia, Alberta, Sparta, Elsa, Tony, Osman, Norman, Silvia, Pioneer, Seedling of Elsa, and Seedling of Silvia. Sweet Russet Crab, and Ostrakoff bore a fair amount of fruit, larger in size than most of Saunders' hybrids, but the trees bear evidence of considerable injury from sunscald and other causes. The Hyslop bore fruit of large size for crab apples, but was late. No fruit of other standard varieties was produced this year, though many trees wintered well.

The orchard has been entirely free from insect attacks, and frost did not do any harm, at any time during the growing season. Fireblight attacked a good many trees, but the diseased parts were cut out and carefully burned so that the disease did not spread. Clean cultivation was practised, all weeds kept down and a dust mulch maintained throughout the season. Cultivation was discontinued after September 1.

The following table shows the results of several tests carried out during the season:—

Variety.	Date of Ripening.	Hardiness of tree x Hardy. xx Very hardy.	Yield (average of Variety.)	Relative size of fruit.	Keeping qualities of fruit G-2½ months. M-1-2 months. P-less than 1 month.	Quality Test. (Preserves).		
						Flavour.	Appearance.	Effects of Cooking.
Gertrude	Early Sept.	x	S.	Large	G.	Very Good	Yellow, handsome	Breaks up.
Bedford	Early Sept.	xx	G.	Good size	M.	Very Good	Yellow, with red blush.	Breaks up.
Osman	Mid-Sept.	xx	V.G.	Rather sm.	M.	Good	Red	Retains shape.
Seedling of Silvia	Late Sept.	xx	G.	Medium	....	Peculiar, rather unpleasant	Greenish	Partly broken up.
Tony	Mid-Sept.	xx	G.	Medium	M.	Good	Green (picked too green).	
Pioneer	Early Sept.	xx	M.	Small	....	Medium	Yellow	Remains firm.
Norman	Mid-Sept.	xx	G.	Small	....	Fairly good	Yellow-red	Remains firm.
Sweet Russet Crab	Late Sept.	x	S.	Large	....	Good	Greenish-yellow, (picked too green)	Breaks up.
Elsa	Mid-Sept.	xx	G.	Medium	....	Good	Yellow	Breaks up.
Columbia	Mid-Sept.	xx	V.G.	Large	G.	Very good	Yellow	Partly broken.
Silvia	Late Aug.	xx	V.G.	Good size	P.	Fair, peculiar	Yellow	
Seedling of Elsa	Mid-Sept.	x	G.	Medium	....	Good	Yellow	Breaks up.
Alberta	Mid-Sept.	xx	M.	"				

A quantity of *Pyrus baccata* seed was sown in the fall, in order to produce hardy stock, for propagating the more desirable varieties of hybrid apples.

In the spring, 50 of the hardiest standard seedlings were transferred to the nursery row, to fill vacancies in the hill-side orchard. It is hoped that these will prove hardy in their permanent location. Several thousand seedlings are still in the nursery, and the hardiest of these will be transplanted to permanent positions as hardiness proves itself. The weaklings will be destroyed and more seedlings grown.

PLUMS.

The plum trees wintered well, and have been growing vigorously during the summer. The crop was not as large as in many previous seasons. The warm weather about the end of April, induced the blossoms to appear early, only to be destroyed by a sudden change in temperature on May 18. A large amount of bloom was thus destroyed. The native plums show a great deal of diversity in size, colour, quality and earliness. Several are very desirable and well worth propagating. With this end in view a pailful of plum pits was sown in the fall. Some of the seedlings will be transplanted and allowed to grow to maturity, while the rest will be used as stock for grafting on scions of the best trees in the orchard. The Cheney and Aitkin are both large, and fair quality, but appear to be rather late for a season like the one just past. Several of Hansen's hybrids are being tested: none appears to be perfectly hardy here. The Opata and Sapa bore some fruit of fair size and good quality. The Hanska ripens too late for this section, while the Skuga did not bear any fruit. Other plums under test are the Cheresota (hybrid) and Compass Cherry (hybrid). One specimen of the former fruited this season.

CURRANTS.

Probably the hardiest and most remunerative fruit-bearing plants for the West, are the currants. Twenty-seven varieties are under observation on this Farm and have proved to be hardy enough to withstand the winter without any protection. The crop this year was below the average. This was due to a severe frost late in May, which caught many of the blossoms which had come out in response to the warm sunny weather of late April and early May. Besides, the red and white varieties suffered very badly from aphis. The damp cloudy weather in June encouraged an attack of mildew, but this was successfully warded off by the use of ammoniacal copper carbonate. Among the red currants the most prolific were: Red Cross, Red Dutch, Raby Castle and Cumberland Red. For large-sized fruit, the Victoria Red and Cherry were easily the best. The white currants did not yield very well, as the insects were particularly damaging to them. The varieties grown are: Large White, White Cherry and White Grape. The black currants are, on the whole, stronger growing and more vigorous than either of the others. The heaviest yielders were: Magnus, Climax, Eagle, Kerry and Eclipse. The Buddenborg did not yield as well as in other years, but it is, as a rule, a high yielder with a fruit surpassing in size all the others. Other good varieties of black currants are, Saunders and Topsy.

Currants ripen during the latter part of July.

GOOSEBERRIES.

The crop of gooseberries was very good. Of the two varieties grown, the Houghton is the more prolific and the hardier, while the Downing bears a fruit of very large size, —far surpassing that of the former variety. It is safest to cover the bushes over winter with a mulch of strawy manure, to prevent killing back of the tender shoots. The bushes are fairly hardy and during the summer were attacked by but one pest—the currant worm, which was easily controlled by spraying with Paris green.

BRANDON.

RASPBERRIES.

The raspberry canes set a very large amount of fruit, but owing to the damage done by red spiders, the yield did not turn out to be so good.

Eight red varieties and one yellow are under test. Those that thrived best, and produced most fruit are: Caroline (yellow), Sunbeam, Ironclad, Herbert, Miller and Turner, in the order named. The largest fruit was produced by the Herbert, Ironclad and Turner, the quality also being very good. The Caroline is small, but of good flavour. The Sunbeam is small and sour, resembling the wild raspberry but is a good yielder. The King and Loudon have not done so well, and have produced but little fruit so far. The Minnetonka, and some additional plants of the varieties already named, were set out in 1914. Of these the Herbert and Sunbeam are the only ones that bore any fruit during 1915. The season for raspberries extends from the middle of July, until late in August.

STRAWBERRIES.

Four varieties of strawberries were planted in 1914. These are grown by the "hill system" (modified) in rows two and a half feet apart, and 15 inches apart in the row. Two of these,—Dakota and Senator Dunlap, wintered well and a large number of new plants were permitted to bear fruit or send out runners during the season and they were consequently strong and well-rooted before winter set in. About 500 of these new plants made very good progress during the summer, and should yield well next season. The yield of fruit this year was rather small,—the Dakota being the best. The strawberry is the earliest cultivated fruit, and as such it deserves special attention from the farmer who wishes to make the most of his farmstead orchard.

ARBORETUM AND GROUNDS.

The arboretum contains about 500 specimens of ornamental trees and shrubs. A number of hedges, windbreaks, avenue trees, etc., are also located on the grounds and along the drives. Two new ornamental hedges—Russian Olive, and Laurel-leaved Willow—were planted this year, while two others—the Siberian Crab and Southernwood (*Artemisia*) were removed. Tall hedges of *Caragana arborescens* and Charles IX lilac surround the vegetable garden, the small-fruit orchard and the plum orchard, and afford excellent shelter. A feature well worth pointing out to visitors is the value of white spruce as a windbreak. If the farmers generally, knew the efficiency and beauty of a spruce hedge (trees planted 4 feet apart) they would not go on year after year without planting these for shelter and ornament on their home grounds.

The following are the chief evergreens on the grounds: (1) White Spruce, very useful as a hedge, as an individual tree or in a mixed plantation; (2) Black Spruce, slow-growing, not very desirable for the home grounds; (3) Blue Spruce, an excellent individual tree for ornamental purposes; (4) Norway Spruce, a few robust specimens are found on the grounds; (5) White Cedar, ornamental in its bush or tree form. A low hedge of this species is much admired by visitors; (6) Scotch Pine, and (7) Riga Pine—both are hardy and robust—good as individual trees or in mixed plantation; (8) Jack Pine, is quite hardy, but the least ornamental of the pines; (9) Red Pine is quite hardy here—a few specimens 10 to 12 feet high are growing on the grounds; (10) Stone Pine, is very slow growing and rather scrubby; (11) Mountain Pine, low and bushy; hardy; (12) *Pinus pumila* (one specimen only, 7 feet high); (13) Balsam Fir, ornamental, quite hardy; (14) Creeping Fir (*Abies excelsa procumbens*); (15) Tamarack (a conifer but not evergreen) is hardy and ornamental. It affords a pleasing contrast to heavier appearing trees, such as the spruces and pines; (16) Juniper (*Juniperus Sabina erecta*)—scrubby; kills back somewhat.

Brandon.

The chief broad-leaved trees are: (1) Elm, this is perhaps the best shade and ornamental tree in Manitoba; (2) Ash, rather open, for a shade tree, but good in mixed plantations; (3) Basswood is very ornamental and has proven quite hardy at this Farm; (4) Birch succeeds well, and is ornamental. A fine tall specimen of cut-leaved weeping birch is frequently commented upon by visitors. Several bushes of low birch are also thriving well; (5) Ginnalian Maple—very ornamental, especially in the fall. This is very desirable for hedges; (6) Poplars. These are very rapid growers, and tower above the other trees in the arboretum. They are not long lived, several are already showing rot in the trunks. A few varieties found here are: *Populus petrowskiana, P. fastigiata, P. Simonii, P. angustifolia, P. tremuloides, P. balsamifera.* The poplars are good for shelter belts, mixed with other more permanent varieties, as they are quick growers. They are very hardy. (7) Willows. These are more hardy and quick growing. Some, such as the laurel-leaved willow, are very desirable as avenue and ornamental trees, as they grow up with a clean trunk, and a symmetrical top. They are also very resistant to insect attack. (8) Ash-leaved Maple, has until recently, been a general favourite, as an avenue or shade tree. It is quick growing and hardy, but very liable to insect attack. This tree should be abandoned, as an avenue tree, in favour of the more graceful elm, or the hardy laurel-leaved willow.

Other species growing in the arboretum, and showing the necessary degree of hardiness are: Oak, Ironwood, Smooth Sumac, Silver Maple, Native Alder and Buckthorn (three varieties). Flowering trees and shrubs are dealt with below.

CALENDAR OF FLOWERING SHRUBS AND TREES.

Beginning to Bloom in May, 1915.

*Native Plum	12th
*Missouri Currant (*Ribes aureum*)	17th
*Saskatoon (native)	18th
*Caragana	18th
Spiraea arguta	20th
Spiraea hypericifolia	20th
*Siberian Crab	20th
*Tartarian Honeysuckle	24th
*Common Lilac	24th
*Hawthorn	24th
*Chokecherry (native)	24th
*Mountain Ash	28th
*Viburnums (i.e. High bush cranberry, sheepberry, wayfaring tree and snowball	28th to June 1st

Beginning to Bloom in June.

*Common Barberry	2nd
*Cotoneaster	3rd
*Siberian Dogwood	3rd
*Spiraea Van Houttei	5th
*Canadian Barberry	4th
Purple-leaved Barberry	4th
Spiraea crutaegifolia	7th
Ninebark (*Physocarpus*)	20th
*Josika's Lilac	20th
*Villosa Lilac	20th
*Amurensis Lilac	20th
*Japanese Lilac	26th

Beginning to Bloom in July.

**Potentilla fruticosa* 10th. (bloom lasted until late in August.)
Spiraea tomentosa 20th. (tender but blooms long.)

N.B.—Those marked with an asterisk are perfectly hardy. The others kill back more or less each winter.

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TREES AND SHRUBS FOR WINTER EFFECT.

Many people do not realize the possibilities in this regard. It is quite practicable to arrange a border with a view to the all-year-round effect; in this arrangement the fall and winter should receive due consideration. For colour effect in the fall, nothing can surpass the fiery red of the Ginnalian maple, the solid green of the common lilac, the light green and gold of the ninebark, combined with the glossy green of the laurel-leaved willow, the silver-grey of the Russian olive, and the purplish-red of the barberry. A good background of evergreens makes these colours all the more striking. In winter we are dependent on the display of persistent fruits, and the bark-colour of the trees and shrubs. White birch, trembling poplar, red willow, golden willow, dogwood, wild rose and highbush cranberry all furnish striking colours, which give a grateful contrast to the general dull tone of the deciduous border in winter. Enhancing effects are gained from the fruit display on the wild rose, cranberry, sheepberry, climbing bittersweet and native hawthorn. In all cases the evergreen should form the "backbone" of the border, in order to relieve the general whiteness of the landscape.

HEDGES.

The most useful hedges for windbreaks, etc., are: Manitoba maple, Ginnalian maple, caragana, common lilac, green ash, and white spruce. Among the best ornamental hedges are: Honeysuckle, caragana, buckthorn, sandthorn, Japanese lilac, nettle tree, white cedar, white spruce, and Ginnalian maple. Native shrubs such as buffalo berry, hawthorn, native plum, saskatoon, hazel nut, wolfberry, wild rose, etc., have shown considerable merit as hedges, and may be recommended where cultivated varieties cannot be obtained.

ROSES.

About fifty new rose bushes were planted last spring. These succeeded variously, some giving a creditable amount of bloom during the season, while most of the others thrived quite well and should flower next summer. A few old bushes of Rugosa roses and Austrian briar roses, (Persian yellow) flowered quite well, the latter coming into bloom on June 20. The rose-beds were covered with straw in the fall.

The following varieties bloomed during the season of 1915:—

Variety.	Began to Bloom.	Amount of Bloom.	Remarks.
Austrian Briar Rose—			
(Persian Yellow)	June 20	M.	Yellow, double.
Rugosa Roses—			
Calocarpa	July 11	L.	Deep rose, single.
New Century (Hybrid)	Aug. 5		Rosy Pink.
Moss Rose—			
Salet	" 13		Deep Pink; double.
Tea Rose—			
Souvenir de Pierre Notting	" 16	S.	Indian yellow. Small double flowers.
Hybrid Tea Rose—			
Gruss an Teplitz	July 12	L.	Crimson. Double.
La France	" 18	S.	Satin pink. Fine Blossom.
Molly Sharman Crawford	" 20	L.	White; double.
Geo. C. Waud	" 25	S.	Orange red.
Lady Ashtown	" 27		Soft Rose colour. Double.
Mrs. Cornwallis West	" 27	S.	Pink.
Mme. Segond Weber	Aug. 7		Bright Salmon Rose. Double.
Ecarlate	" 12	S.	Bright Scarlet. Semi-double.
Mrs. Aaron Ward	" 12	S.	Shades of Indian Yellow. Double.
Mme. Abel Chatenay	" 19	S.	Rose, with shade of salmon; fine double rose.
Hybrid Perpetual Roses—			
Magna Charta	July 13	M.	Deep Pink. Fine double.
Jules Margottin	Aug. 11	M.	Rose coloured. Single.
Mrs. R. G. Sharman Crawford	" 7	L.	Rosy Pink. Double.
Paul Neyron	" 18		Deep rose colour.

BRANDON.

LAWNS.

A new lawn, seeded down to Kentucky blue grass about the end of April, developed a fine dense sward during the summer. The portulaca and barnyard grass were serious weeds, but after they were pulled up once, the grass got ahead of them and should keep down all weeds in the future. Portions of lawns that were seeded down in June did not produce any results on account of the drought.

INSECT PESTS.

The season was very bad, from the point of view of insect injury. The most serious insects were the aphids and cankerworms on the maple. It is important to educate the public and arouse public sentiment in favour of insect destruction, as otherwise, insect pests will greatly hamper the operations of the horticulturist and the general farmer.

Several species of aphids were observed doing damage at this Farm. They infested maples, viburnums, currant bushes, plum trees, dogwood, balsam fir, elm and others. Kerosene emulsion and tobacco-and-soap solution are effective remedies, except in the case of the woolly aphis of the elm. This insect rolls or curls up in the leaves into galls, which it uses for breeding and hibernating quarters. The emulsion cannot penetrate these galls, to smother the insect. As in the case of the galls of the *Pemphigus vagabundus* (another aphid), the best method of control is handpicking and burning the galls and contents.

Insects which can be controlled by poisonous sprays are *cankerworm* (the fall-cankerworm appeared here), *spruce budworm* and *tent caterpillar*. A species of this last insect was found on some of the native shrubs but did not affect the arboretum specimens.

Gall forming insects of minor importance: (1) A species of Cecidomyidæ on the terminal buds of the maples in the spring. (2) *Eriophyes acericolæ*—mites causing innumerable small galls on the plum tree leaves. (3) Frost mites (Genus *Eriophyes*) on the leaves of maples and some other deciduous trees.

An insect which is likely to cause serious trouble in the West is the *Negundo Twig Borer*. The larvæ inhabits the petioles and tender growing shoots of the maple, causing enlargements and consequent destruction of the affected part. No sprays will reach the seat of the trouble.

Red Spiders attacked the small spruce hedge but were controlled by a spray of tobacco-soap solution.

A considerable number of plums were spoiled by the *Plum Gouger*. Horticulturists in the West have noted its work for some years past.

A *Snout Beetle* (Rhynchitis bicolor) destroyed many of the flower buds on the cultivated roses. These should be hand-picked constantly, as they are very destructive to roses.

The summer was in many respects unfavourable to a good display among annuals and perennials. No month was entirely free from frosts, and as early as August 24 the thermometer registered 3 degrees of frost and 6 degrees on August 26. This was succeeded on August 31 by the maximum of the season, viz., 94·5. Several night frosts occurred during the first part of September. A continuous drought lasting from late July until early September, also affected the flowers adversely. Considering the circumstances, the display was very good, and lasted well into the fall. Altogether about 300 varieties of bulbs, perennials, annuals and tubers (dahlias) were grown outside during the season. Observations were made regarding the hardiness and general desirability of the different varieties.

BRANDON.

BULBS (OUTSIDE).

Nineteen varieties of tulips were planted outside in the fall of 1914 and mulched for the winter. These made an excellent showing for three weeks succeeding May 5. They were removed to make room for the annuals about the beginning of June.

BULBS (INSIDE).

A number of bulbs were potted in the fall for winter use. They gave very satisfactory results and by the use of different kinds a succession of bloom was possible from Christmas until spring. The following kinds are recommended for use in order to give length of season. They are given in the order in which they should be used:—

Roman Hyacinths.
Dutch Hyacinths.
Golden Spur.. .. .. Daffodil.
Sir Watkin.. .. .. Daffodil.
Van Sion.. .. .. Double Daffodil.
Prince of Austria.. .. .. Tulip.
Victoria.. .. .. Daffodil.
Emperor.. .. .. Daffodil.
Murillo.. .. .. Tulip.

There are very many other good kinds but these give a good selection and have given excellent results here.

PERENNIALS.

The perennials in the old border made a good showing, the chief being: varieties of iris, pæonies, day lilies, heliotrope, campanula and gypsophila. A considerable number of plants were added to the new border, but many of these died owing to unfavourable spring conditions. The perennials may be grouped according to the dates on which they flower, thus:—

MAY-FLOWERING:—*Anemone sylvestris, Scilla sibirica, Phlox subulata, Viola pedata, Trollius caucasicus.*

JUNE-FLOWERING:—*Aquilegia, Dicentra spectabilis* (Bleeding heart), *Hesperis matronalis, Clematis recta,* Snowball Daisy.

JULY-FLOWERING:—*Delphinium, Gaillardia, Coreopsis, Spiræa Aruncus, Dianthus chinensis,* (pinks), *Platycodon grandiflorum,* Pæonies, *Hemerocallis, Veronica spicata, Lychnis chalcedonica, Heliotropium peruvianum, Solidago* (Golden rod), *Sedum* (Stone crop), *Centaurea, Campanula tridentata, Gypsophila, Monarda* (Horse mint), *Dianthus barbatus* (Sweet William), Cactus (*Opuntia*).

AUGUST-FLOWERING:—*Spiræa Ulmaria, Rudbeckia, Helianthus* (Sunflower), *Althæa* (Hollyhocks), Perennial Phlox.

SEPTEMBER-FLOWERING:—*Chrysanthemum uliginosum* and *Lupinus polyphyllus.*

Many of these flower quite late in the season, especially chrysanthemum, gaillardia, rudbeckia, hollyhocks, veronica, solidago, phlox, helianthus and snowball daisy.

DAHLIAS.

None of the dahlias did well on account of the frosts late in August. Very few had bloomed at that time, as they were not set out until July.

ANNUALS.

The table given below shows the flowering periods of some of the best annuals. As will be seen from the graphic representation given, the best display was on from early July to late August. A few hardy desirable types lasted until the middle of October.

Flower Calendar, 1915 (Annuals).

Name.	Height.	June.				July.				August.				September.				October.		DR	FR	Remarks.
	Inches.	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2			
Tagetes signata pumila	8																			G	H	Profusion of bloom.
Celosia plumosa	3																			G	T	Inconspicuous bloom.
Bartonia aurea	13																			G	H	
Pansies (10 varieties)																				G	H	Less bloom during drought
Chrysanthemums (2 varieties)	19–20																			G	H	
Arctotis grandis	20																			G	H	
Calendula (2 varieties)	18–20																			G	H	Sturdy plants; showy blossoms.
Clarkia elegans	21																			G	H–H	Blossoms delicate, of light colour.
Cosmea, mixed	45																			G	H–H	Straggly plant.
Dimorphotheca aurantiaca	10																			G	H	Persistent bloomer.
Petunia (3 varieties)	12																			P		Unsightly during drought.
Phlox (7 varieties)	12–16																			VG	H	Attractive; persistent bloomer.
Godetia (Bridesmaid)	15																			M	H	Blossoms delicately coloured and attractive.
Godetia (other varieties)	12–18																			M	H	Blossoms delicately coloured and attractive.
Nemesia (6 varieties)	10–12																			M	H	Very desirable for borders, good colours.
Acroclinium (Everlasting)	18																			G	H	Blossoms stiff and not fragrant.
Abronia umbellata																						

Name.	Height.	June.				July.				August.				September.				October.		DR	FR	Remarks.
	Inches.	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2			
Balsam (3 varieties)	12–14					....	....	....	....	....	....	....	....							M	T	Very tender plant.
Brachycome	10					....	....	....	....	....	....	....	....							G	H–H	
Lobelia	10						....	....	....	....	....	....	....	....						M	H–H	Good for borders.
Marigold (2 varieties)	24					....	....	....	....	....	....	....	....							G	H–H	
Mignonette	12					....	....	....	....	....	....	....	....	....	....	....	....			G	H	Sweet scented.
Portulaca	8					....	....	....	....	....	....	....	....	....						G	H	Low and spreading plants.
Schizanthus	16					....	....	....	....	....	....	....	....							M	H–H	Blossoming spikes very attractive.
Viscaria cardinalis	20					....	....	....	....	....	....	....	....							M	H	Bloomed freely till the 20th Aug.
Centraathus	12					....	....	....	....	....	....	....	....	....								
Verbena (6 varieties)	8–15						....	....	....	....	....	....	....	....	....	....	....	....		V.G	H	Very desirable, hardy.
Coreopsis (2 varieties)	24–28							....	....	....	....	....	....							G	H–H	Blossoms froze late August
Cockscomb							....	....	....	....	....	....	....							G	T	
Gaillardia	17						....	....	....	....	....	....	....	....	....	....	..			G	H	Strong plants, rather showy.
Rudbeckia	22						....	....	....	....	....	....	....	....	....	....	....			G	H	
Salpiglossis (2 varieties)	25						....	....	....	....	....	....	....						xx	G	H–H	Blossoms frozen, late Aug.
Stocks (6 varieties)	12					....	....	....	....	....	....	....	....	....	....	....	....	....	....	G	H	Desirable flowers.

Name.	Height.	June.				July.				August.				September.				October.		DR	FR	Remarks.
	Inches.	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2			
Sweet Sultan	26						...	....	....	....	....	....	....	....						G	H	
Antirrhinum—																						
Tall	22							..	....	....	....	....	....	....	....					G	H	Growth rank.
Intermediate (8 varieties)	16						....	....	....	....	....	....	....	....	..					G	H	Showy colours; good bloomer.
Cornflower	30							....	....	....	....	....	....	....	....	....	....	....	....	G	H	Showy colours; good bloomer.
Dianthus Heddewigii	6							....	....	....	....	....	....	....	....	....	....	....	xx	G	H	
Nigella (Miss Jekyll)	18							....	....	....	....	....	....	....	....					G	H	
Linum grandiflorum	14								....	....	....	....	....	....	....					G	H	Blossoms very fine.
Eschscholtzia	14								....	....	....	....	....	....	....	....	....	....		G	H	Blossoms persistently.
Sweet Peas (65 varieties)									....	....	....	....	....	....	....	....	....	....		G	H	
Candytuft	9									....	....	....	....	....	....	....	....	....	xx	V.G	H	Blooms intermittently.
Helichrysum (Everlasting)	30									....	....	....	....	....	....	....	....	....	xx	G	H	
Larkspur (3 varieties)	38									....	....	....	....	....	....	....	....	....		G	H	
Lupinus	16									....	....	....	....	....	....	....	....	....		G	H	
Nasturtium (3 varieties)	9									....	....	....	....	..	....	....	....	....		M	H-H	Spikes bloom freely.
Leptosiphon	5									....	....	....	....	....	....	....	....	....		G	H	
Antirrhinum, Tom Thumb (6 varieties)	7–10										....	....	....	....	....							Very small; blooms well.
Snowball Aster										....	....	....	....	....	....	....	....	....		G	H	

Name.	Height.	June.				July.				August.				September.				Octobre.		DR	FR	Remarks.
	Inches.	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2			
Early Branching Asters										....	....	....	....	....	....	....				G	H	
Other Variety of Asters										....	....	....	....	....	....	....	....	....		G	H	
Jacobaea, Double	13										....	....	....	....	....	....	....			G		Bloom very shortlived.
Malope	15										....	....	....	....	....					G	H-H	
Carnation (Marguerite)	20											....	....	....	....	....	....	....	xxx.	G	H	
Poppy, Shirley	26									....	....	....	....	....						G	H	
Poppy, Carnation Mixed	18									....	....	....	....	..						G	H	

N.B.—xxx—Blossoms lasted till snow fell in early November.
xx—Bloom lasted until plants were dug up on 12th October; most were declining, however.

Explanations:—The dotted line shows graphically the flowering period of each variety. Each month is divided into four divisions, corresponding roughly to the weeks. Under "Remarks"—Dr. R. means drought resistent qualities, and Fr. R. refers to the hardiness of plants with reference to frost. G—good; M—Medium; P—Poor; H—hardy; H-H—half hardy; T—tender.

SWEET PEAS.

The display of sweet peas was somewhat lessened by the drought which lasted during the main flowering season, viz., August and early September. Sixty-five varieties were grown. The border was checked over every ten days for general hardiness, profusion and colour of bloom of the different varieties. The table includes twenty-five of the best:

PRINCIPAL Varieties of Sweet Peas.

Name of variety.	Length of vines.	Colour of bloom.	Amount of bloom.	Duration of bloom.	General Hardiness.	Remarks.
White—						
(1) Etta Dyke	3′ 6″	Pure white	Large	26th July to 20th Sept	Good	
Nora Unwin	3′ 11″	Pure white	Large	31st July to 4th Oct	"	Very vigorous and profuse bloom.
Cream—						
Mrs. C. W. Breadmore	3′ 6″	Creamy white, edge pink	Medium	24th July to 20th Sept	"	
(2) Queen Victoria	3′ 8″	Primrose (cream)	Large	22nd July to 5th Oct	"	
Clara Curtis	3′ 8″	Primrose	Large	25th July to 4th Oct	"	
Pink, etc.—						
Elfrida Pearson	3′ 9″	Salmon Pink	Large	22nd July to 1st Oct		Double standards.
Mrs. Cuthbertson	3′ 5″	Rose Pink, wings nearly white	Medium	24th July to 4th Oct	Medium	Bloom intermittent but very fine.
Mrs. R. Hallan	3′ 6″	Rich pink	Large	27th July to 4th Oct	Good	Profusion of bloom.
(3) Hercules	3′ 9″	Rose pink	Large	25th July to 1st Oct	"	
Charles Foster	4′ 2″	Suffused pink, mauve and rose	Large	28th July to 22nd Sept	"	Strong, tall vines; double standards.
Prima Donna	4′ 8″	Pure pink	Large	1st Aug. to 4th Oct	"	Tall vines, blooms very freely.
Red, Salmon, etc.—						
Rose du Barri	3′ 3″	Rich rose red	Large	27th July to 20th Sept	Medium	Colour, very pleasing, vines very small.
(4) Queen Alexandra	3′ 6″	Rich scarlet	Large	24th July to 28th Sept	Good	Bloomed very freely.
Decorator	3′ 8″	Rose red, shade salmon	Medium	23rd July to 4th Oct	"	Persistent bloomer.
Vermilion Brilliant	4′	Crimson, (Vermilion)	Medium	21st July to 4th Oct	Good	Blooms early and lasts well.
(4) John Ingman	3′ 11″	Rosy Carmine (red)	Large	23rd July to 4th Oct	"	Pleasing shade of colour. Strong bloomer.
Lavender, blue, etc.—						
Captivation Spencer	3′ 3″	Red, tinged purple	Medium	26th July to 12th Sept	Good	Very pleasing shade of colour.
Tennant Spencer	4′	Rosy Purple	Large	24th July to 22nd Sept	"	Large amount of bloom. Short vines.
Asta Ohn	3′ 6″	Lavender	Large	24th July to 29th Sept	"	

(5) Florence Nightingale	4′		Deep lavender, suffused rose-pink	Large	1st Aug. to 4th Oct	"	Fine bloom.
Lady Grisel Hamilton	3′	11″	Pale lavender	Large	20th July to 4th Oct	"	Long blossoming season.
Lord Nelson	3′	3″	Deep navy blue	Large	23rd July to 1st Oct.	"	Vines rather small.
Maroon—							
(6) Nubian	3′	5″	Maroon	Medium	30th July to 19th Sept.	"	
Variegated—							
America Spencer	3′	3″	White, marked crimson.	Large	30th July to 4th Oct.	"	
(7) Mrs. W. J. Unwin			White, marked with scarlet	Medium	25th July to 20th Sept.	"	

Other good varieties are:—

Group 2.—Mrs. Collier, Mrs. Routzahn.
Group 3.—Countess Spencer.
Group 4.—Stirling Stent, Barbara, Miss Wilmott, Helen Lewis.
Group 5.—Irish Belle, or "Dream", Mrs. Walter Wright.

EXPERIMENTAL FARM, INDIAN HEAD, SASK.

REPORT OF THE SUPERINTENDENT, W. H. GIBSON, B.S.A.

The growing season of 1915 was not favourable for early vegetables. The months of April, May, and the early part of June were very dry, and vegetable seeds came up somewhat unevenly, and, in a few cases, had to be resown. A moderate rainfall was received during the latter part of June and throughout July, August, and September. This, with an abundance of sunshine, brought all vegetables along well and an average crop was obtained.

Frost was experienced every month during the season, which checked tender flowers and vegetables to some extent.

Fruit trees and bushes blossomed profusely but a severe frost on June 7 killed all bloom, and no fruit was obtained.

Potatoes gave good yields on the Experimental Farm, but throughout the district the crop was not up to the average.

Exhibits of flowers and vegetables were made at the summer fairs held in Regina, Swift Current, Wolseley, and Whitewood.

Insect pests gave some trouble during the early summer but were easily kept in control by the application of an insecticide at the proper season.

FRUIT TREES.

There are at present about one thousand cross-bred and standard apple trees in the several orchards on the Indian Head Farm. The cross-bred varieties were originated by the late Dr. Wm. Saunders, and have been under test at this farm since 1903. These were produced by crossing standard varieties of apples with the hardy Siberian crab (*Pyrus baccata*). The trees have proved perfectly hardy at Indian Head, and produce good crops almost every season. The fruit is about the size of an ordinary crab, and is suitable for preserving and making jelly. Severe frost during the early part of June prevented any crop being obtained this past season. Those that have proved the best are Charles, Columbia, Silvia, Jewel, Prince, Pioneer, Tony and Eve.

Of late years, considerable attention has been given to growing standard apples, the object being to find some varieties hardy enough to withstand our severe seasons. In 1913, fifty 2-year old trees were obtained from Mr. A. P. Stevenson of Dunston, Manitoba. These were set out in a well sheltered location, and have come through their third winter in perfect condition. In 1914 an additional 150 2-year old trees were set out but, owing to the dry season, made a very poor growth and the following spring 20 per cent were found to be dead. Those that came through made a good growth this past season and went into the winter in fine condition. The varieties under test are Wealthy, Hibernal, Blushed Calville, Volga Anis, Anisette, Repka Kislaga, Charlamoff, Hyslop, Transcendent, Philip, Lyman, and Whitney. The last five named are crab apples.

PLUMS.

Until recent years very little success could be reported with plums. Up to 1908 this work had consisted in selecting superior strains of the native Manitoba sorts, and by such methods some very good fruit was obtained. In the spring of 1908 a number

of cross-bred trees were received from Professor Hansen of Brookings, South Dakota. The majority of these have proved to be perfectly hardy, and some very fine fruit has been obtained from several varieties. For the past two seasons, buds and grafts have been taken from the best trees and used on native stock. In this manner some good trees have been propagated and will be set out in the orchard this coming spring. The varieties worthy of mention are Assiniboine, Tapa, Hanska, Winnipeg, Owanka and Huya.

The Compass cherry is perfectly hardy and bears large crops almost every season, but on account of its lateness in ripening cannot be recommended as a suitable fruit for this district.

SMALL FRUITS.

The plantation of small fruits set out in 1912 has made good progress but, owing to spring frosts, no fruit was obtained this past season. With the exception of gooseberries, nearly all bush fruits have proved suitable for Southern Saskatchewan. Gooseberries are subject to severe winter killing and, unless some protection is afforded during winter, very little success will be attained.

Raspberries also require winter protection and this is best accomplished by bending down the canes and covering with several inches of earth. If left covered until about the 10th of May they are not liable to come into bloom until after all danger of frost is over. Owing to killing frosts being experienced up to June 15, this plan was unsuccessful this past season.

The following are the names of some of the best varieties now under test:

Raspberries.—Herbert, Cuthbert, Early King, Marlboro, Sunbeam and Golden Queen (white).

Red Currants.—Victoria Red, Red Dutch, Red Grape, Greenfield Red and Rankins Red.

White Currants.—White Grape, White Cherry, Verrieres White and White Imperial.

Black Currants.—Climax, Dominion, Eagle, Eclipse, Magnus, Topsy and Saunders.

Gooseberries.—Downing, Houghton and Smith Improved.

STRAWBERRIES.

As a rule strawberries give a fair crop almost every season but, owing to spring and summer frosts, very few were obtained this past summer. The beds should be protected in the winter with a covering of straw or leaves. By leaving the covering on the beds until about the 15th of May, the growth is held in check until danger from late spring frosts is over. Senator Dunlap and Beder Wood are the two varieties that have given the best results at this farm.

EXPERIMENTS WITH VEGETABLES.

Potatoes.—Twenty-three varieties were under test in 1915. The seed was planted on May 14 in rows 30 inches apart and the sets eight inches apart in the row. Cultivation was given three times before hilling up on July 8. Potatoes were dug on September 30 and gave a very good crop considering that the season's rainfall was far below the average. Below is given a list of the varieties under test with the yield per acre.

INDIAN HEAD.

VARIETY TEST.

Variety.	Character of soil.	Yield per acre.		Form and Colour.
		Bush.	lb.	
Carman, No. 1	Clay loam	567	36	Oval—White.
New Queen	"	547	48	Oval—Pink and White.
Morgan Seedling	"	543	24	Round—White.
Dreer Standard	"	534	36	Oval—White.
Vermont Gold Coin	"	530	12	Oval—White.
Everett	"	523	36	Long—Pink.
Wee MacGregor (selected)	"	517		Oval—White.
Manitoba Wonder	"	517		Oval—White.
Wee MacGregor	"	508	12	Oval—White.
Early Norther	"	503	48	Long—Red
Table Talk	"	500	40	Oval—White.
Houlton Rose	"	500	32	Oval—Red.
Dalmeny Beauty	"	470	48	Oval—White.
Eureka Extra Early	"	470	48	Oval—White.
Early Hebron	"	468	36	Long—Pink and white.
Early Ohio (selected)	"	466	24	Oval—Red.
Empire State	"	466	24	Long—White.
Money Maker	"	462		Round—White.
Rawlings Kidney	"	448	48	Oval—White.
Bermuda Early	"	442	12	Oval—Red.
Irish Cobbler	"	429		Round—White.
Late Puritan	"	424	36	Oval—White.
Early Ohio	"	415	48	Oval—Red.
Vick Extra Early (O.S. 1914)	"	292	36	Oval—Pink.
Morgan Seedling (O.S. 1914)	"	39	36	Round—White.

EXPERIMENTS with Potatoes.

Variety.	Nature of Experiment.	Yield per acre.	
		Bush.	lb.
Wee MacGregor	Small potatoes, ½ to 1 inch, uncut	495	
Early Ohio	Small potatoes, 1 to ½ inch, uncut	451	
Wee MacGregor	Medium sized potatoes cut to one eye	436	52
Early Ohio	Medium sized potatoes cut to one eye	333	24
Wee MacGregor	Medium sized potatoes cut to two eyes	510	14
Early Ohio	Medium sized potatoes cut to two eyes	459	48
Wee MacGregor	Medium sized potatoes cut to three eyes	481	48
Early Ohio	Medium sized potatoes cut to three eyes	369	36
Wee MacGregor	Seed coated with fresh lime when cut	521	24
Early Ohio	Seed coated with fresh lime when cut	374	
Wee MacGregor	Seed planted without lime coating	499	24
Early Ohio	Seed planted without lime coating	391	36
Wee MacGregor	Seed sprouted before planting	525	48
Early Ohio	Seed sprouted before planting	466	24
Vick Extra Early	Seed sprouted before planting	490	36
Wee MacGregor	Seed planted on May 31st	495	
Early Ohio	Seed planted on May 31st	431	12
Wee MacGregor	Seed planted on June 7th	420	12
Early Ohio	Seed planted on June 7th	360	48
Wee MacGregor	Seed planted on June 21st	345	24
Early Ohio	Seed planted on June 21st	365	12
Early Ohio	Seed planted on July 5th	270	36

In addition to the above work a series of cultural experiments was commenced on one-twentieth acre plots. These experiments will extend over a period of five years in order to arrive at an average for a number of seasons. An experiment was also commenced with a view of ascertaining the cost of growing potatoes under existing conditions. An exact record was kept of the labour on an acre plot up to the time the potatoes

INDIAN HEAD.

were stored away in the root cellar. The total, including seed and rent of land, amounted to $84.15. The yield of marketable potatoes was 401 bushels which brought the cost practically 21 cents per bushel. A walking plough was used for opening up the drills, and also for ploughing out the crop. By the use of modern potato machinery which would be employed in planting large areas, the cost could be considerably reduced.

VARIETY TESTS WITH VEGETABLES.

Asparagus.—Owing to the dry weather early in the season this crop was almost a failure. Several small pickings were obtained from Barr Mammoth and Conover Colossal. The quality was very poor, the stalks being tough and stringy.

Beans.—Thirteen varieties were sown in the garden on the 8th of May. Frost on September 11 destroyed all the vines and no seed ripened. Below is given a list of the varieties under test.

Variety.	Date of Blooming.	Ready for use.	Remarks on crop.
New White Seeded Green Pod	July 18	Aug. 11	Good crop of green pods.
Bountiful Green Bush	" 22	" 14	" " "
Grennell Rustless Wax	" 23	" 6	Fair " "
Refugee or 1000 to 1	" 26	" 24	Good " "
Keeney Golden Wax	" 26	" 16	" " "
Stringless Green Pod	" 24	" 14	" " "
Valentine Wax	" 22	" 12	" " "
Wardwell Kidney Wax	" 20	" 9	" " "
Extra Early Valentine	" 30	" 16	" " "
Extra Early Refugee	" 26	" 18	Very poor crop.
Michigan White Wax	" 30	" 20	Good crop of green pods.
Keeney Rustless Wax (I.H. Seed)	" 26	" 16	Extra good crop of green pods.
Wardwell Kidney Wax (I.H. Seed)	" 26	" 16	" " "

Beets.—Seven varieties were sown in the garden on May 6. The roots were taken up on October 7 and yielded a satisfactory crop. The rows were 2 feet apart, and plants were thinned to 3 inches apart in the row.

A test was also made in thinning plants 2, 3, 4 inches apart in the rows. Those thinned to 2 inches gave the largest yield but roots were undersized. Those thinned to 3 inches yielded less but roots were of good size and quality. Those thinned to 4 inches gave the smallest yield, while roots were oversized and coarse in quality.

Variety.	In use.	Yield per acre.		Remarks.
		Bush.	lb.	
Eclipse	Aug. 4	556	36	Quality excellent.
Ruby Dulcet	" 10	544	30	" "
Early Model	" 4	538	27	" medium.
Crosby Egyptian	" 10	484		" good.
Rennie Cardinal Globe	" 4	459	48	" "
New Meteor	July 30	447	22	" "
New Early Black Red Ball	Aug. 14	423	30	" medium.

Brussels Sprouts.—One variety, Dwarf Improved, was sown in the hot-house on March 28, and transplanted into the garden on June 2. The plants made a strong growth but failed to form sprouts.

INDIAN HEAD.

Cabbage.—Eleven varieties were sown in the hot-house on March 23 and transplanted into the garden on June 2. The crop obtained was quite satisfactory. Very little damage was done by the cut-worm or cabbage butterfly during the season. In order to prevent the butterfly from depositing eggs on the cabbage a number of plants were covered with cheese cloth at the time of transplanting. The result was that while the heads were entirely free from worms, they were small and soft and quite unfit for winter keeping.

CABBAGE.—Test of Varieties.

Variety.	Ready for use.	Average weight per head.	Remarks.
		lb.	
Glory of Enkhuizen	Sept. 10	11	Very fine quality.
Extra Amager Danish Roundhead	" 6	10	Extra fine quality.
Danish Summer Ballhead	Aug. 30	10	Good solid heads.
Extra Amager Danish Ballhead	Sept. 8	10	Extra fine heads.
Nofalt	Aug. 4	9	Good solid heads.
Flat Swedish	Sept. 6	9	Heads very soft.
Fottler Improved Brunswick	" 10	8	Medium quality.
Early Jersey Wakefield	July 28	4½	Medium quality.
Copenhagen Market	" 30	4	Heads good quality.
Rennie XXX Early Summer	" 26	4	Medium quality.
Paris Market, Very Early	" 22	3	Good quality.

Cauliflower.—Four varieties were sown in the hot-house on March 24, and transplanted into the garden on May 4. An average crop was obtained. A number of plants were protected by a covering of cheese cloth during the season. As a result, while the heads were free from worms, they were very small and of poor quality.

Variety.	Ready for use.	Average weight per head.	Remarks.
		lb.	
Early Snowball	June 28	4	Quality good.
Extra Selected Early Dwarf Erfurt	" 30	3	" medium.
Gilt Edge	July 9	3	" "
Danish Giant Dryweather	" 12	2	" "

Carrots.—Four varieties were sown on April 16, and the crop taken up on September 29. The yield was satisfactory. A test was also made in thinning the plants to different distances. Those thinned to 1½ inches gave the largest yield but the roots were undersized. Those thinned to two inches, while yielding less than the first lot, gave good sized carrots, while those that were thinned to three inches gave the smallest yield of large smooth roots.

Variety.	In use.	Yield per acre.		Remarks.
		Bush.	lb.	
Half Long Chantenay	July 30	689		Good crop and quality.
Improved Nantes	" 24	618	20	Good crop and quality.
Early Scarlet Horn	" 24	583		Good crop and medium quality.
Improved Danvers Half Long	" 26	565	20	Good crop and medium quality.

Celery.—Eight varieties were sown in the hot-house on March 18, and transplanted into the garden on June 16. The different varieties were planted in trenches 18 inches deep and 12 inches wide. In the bottom of the trench 6 to 8 inches of well rotted manure was placed. On the top of the manure 6 inches of good black loam was packed in solid and the celery planted in this earth. As the plants grew the top earth was hilled up around them in order to blanch the stalks. As celery requires lots of moisture during the growing season it is well to give it a good soaking once or twice each week. A test was also made of several methods of blanching. The plants were planted on the flat and when about 12 inches high the first lot was protected with a soft pliable material similar to heavy roofing felt. This was tacked to pickets set on each side of the row. The second method was with 1 by 12-inch boards set on edge on each side of the row. The third test was with earth hilled up against the stalks. The first two lots were tough and stringy with a very poor flavour. The lot that was earthed up was excellent in flavour and crispness. The following are the varieties under test this season.

Variety.	In use.	Weight per 12 heads.	Remarks.
		lb.	
French Success	Sept. 14	28	Good yield and quality.
Paris Golden Yellow	" 28	26	" "
Giant Pascal	" 30	25	" "
Evans Triumph	" 30	25	" "
White Plume	Aug. 24	24	" "
Noll Magnificent	Sept. 30	24	Medium in quality.
Improved White Plume	Aug. 4	24	" "

Garden Corn.—Fifteen varieties of garden corn were planted on May 22. Only a few varieties matured sufficiently for table use. None matured for seed. The best crop was obtained from the home grown seed of White Squaw which for the past few seasons has been selected from the largest and earliest cobs.

Variety.	In use.	Remarks.
White Squaw	Sept. 4	Cobs small, quality good.
Early Iowa	Oct. 2	Cobs large, poorly filled.
Pocahontas Sweet		Cobs did not mature.
Metropolitan Sweet		
Early Dawn		
Perkins Extra Early Market		
E tra Early Adams		
Golden Bantam		
Early Fordhook		
Early Malcolm	Oct. 2	Cobs large but poorly filled.
Malakoff	" 4	Cobs small but poorly filled.
Peep O'day		Cobs did not mature.
Improved Squaw, I.H. Seed	Sept. 4	Cobs small, quality very good.
Red Squaw, I.H. Seed	Aug. 28	Cobs small, quality very good.
White Squaw, Selected I.H	" 28	Cobs large and excellent quality

Cucumbers.—Ten varieties were under test. The seed was sown in the garden on June 15, and plants protected during the season by a frame and glass. Owing to the fact that the fruit did not set until very late in the season a very small crop was obtained. Six plants of Rollinson Telegraph were started in the hot-house and transplanted to a cold frame on June 15. These were protected by glass during the season and produced 319 pounds of excellent cucumbers.

Variety.	In use.	Weight per plant.	Remarks.
		Lb.	
Giant Pera	Sept. 3	4	Small, medium quality.
Prize Pickling	" 9	3	Small, medium quality.
Extra Early Russian	Aug. 30	4	Small, medium quality.
Peerless or Improved White Spine	" 28	6	Medium size.
Cool and Crisp	Sept. 7	2	Small, poor quality.
Davis Perfect			No fruit set.
Fordhook Famous			No fruit set.
Rennie XXX Table	Sept. 7	5	Fair size and quality.
Evergreen Beauty			No fruit set.
Rollison Telegraph	June 27	53	Large, excellent.

Leeks.—Two varieties were under test. The seed was sown in the hot-house on March 25 and the plants transplanted to the garden on June 16. The plants were set in a trench similar to that used for celery and as the stalks grew they were hilled up with earth in order to bleach. The leek is a vegetable that deserves more attention than it at present receives in the gardens of Southern Saskatchewan. The varieties under test were French Carentan and English Glory. The first-named gave a very good crop, while the latter, resembling Musselburgh, was not up to the average.

Lettuce.—There were eight varieties under test. The seed was sown on April 16, and the first was ready for use on June 18. The fore part of the season being dry and windy, the plants did not get a good start and, in consequence, the crop was not up to the average. The following table will give a list of the varieties under test:—

Variety.	In use.	Remarks.
Giant Crystal Head	June 26	Crop fair, quality good.
Grand Rapids forcing	" 18	Crop fair, quality good.
Hanson Improved	" 30	Crop medium, quality fair.
Iceberg	" 20	Crop medium, quality fair.
Dreer All Heart	" 30	Crop and quality poor.
Rennie Nonpareil	" 26	Crop and quality good.
Deacon	" 28	Crop and quality medium.
May Queen	July 4	Crop and quality good.

Muskmelon.—Four varieties were under test. The seed was sown in the hot-house on March 24. The plants were set out in cold frames on June 14. The frames were covered on cool nights, and opened up during the day time. A splendid crop of large, well-flavoured fruit was thus obtained. It is interesting to note that the seed saved from fruit grown at this Farm gave the largest crop and also the largest melons. The following table will give a list of the varieties under test:—

Variety.	Date ripe.	Remarks.
Salzer Earliest Ripe	Sept. 15	Heavy crop of large sized fruit.
Improved Watters Solid	" 4	Medium crop, poor flavour.
Earliest of All	" 14	Medium crop, large sized melons.
Earliest Ripe (I. H. Seed)	" 9	Extra yield of large melons.

Onions.—Fifteen varieties were under test. The seed was sown in the garden on April 15 and the crop taken up on September 29. The early part of the season was dry and windy and, consequently, the young plants got a very poor start. The crop obtained was only medium in yield and quality. A test was made of fall versus spring sowing. Seed of Red Wethersfield was sown on October 3, 1914, and again on April 15 following. That sown in the fall came up early and had a good start on the spring-sown seed. The final results, however, were only slightly in favour of fall sowing. Plants started in the hot-house and transplanted in the garden gave slightly heavier yields than seed sown in the open.

The onion maggot, which was troublesome in past years, was not in evidence this season. Consequently, no data were obtained from the work carried on for its control by the use of different poison solutions applied to the roots of the young plants. Below is given a list of the varieties under test.

Variety.	Yield per acre.		Remarks.
	Bush.	Lb.	
Very White Pearl	217	40	Quality very poor.
Johnson Dark Red Beauty	365	..	Quality medium.
Salzer Great Red Wethersfield	387	10	Quality medium.
Red Globe	435	30	Quality medium.
White Globe	411	20	Quality medium.
Yellow Globe	338	40	Quality poor.
Danvers Yellow Globe	290	20	Quality poor.
Large Red Wethersfield	411	20	Quality medium.
Ohio Yellow Globe	411	20	Quality medium.
Rennie XXX Connecticut Yellow Globe	314	30	Quality poor.
Extra Early Red	363	..	Quality medium.
Australian Brown	145	10	Crop and quality poor.
Early Flat Red	290	20	Quality very poor.
White Early Barletta	314	30	Quality poor.
White Queen	338	40	Quality medium.

Garden Peas.—Eighteen varieties were under test. The seed was sown on May 6 and fair yields were obtained. The heaviest yields were obtained from seed grown at Indian Head. The table below will give the date on which the different varieties were ready for use and ripe:—

Variety.	In use.	Ripe.	Remarks.
Dainty Duchess	Aug. 6	Sept. 16	Good crop.
Gradus	July 20	Aug. 20	Medium crop.
Sutton Excelsior	Aug. 6	" 26	Medium crop.
Quite Content	Aug. 12	Sept. 18	Medium crop.
Advancer	" 9	" 8	Good crop.
Gregory Surprise	July 18	Aug. 12	Medium crop.
Early Giant	" 23	Sept. 14	Crop very poor.
Premium Gem	" 24	Aug. 24	Medium crop.
Heroine	Aug. 6	Sept. 14	Good crop.
The Lincoln	" 14	" 14	Good crop.
Juno	" 14	" 18	Medium crop.
Stratagem	" 9	" 17	Medium crop.
Telephone	" 4	" 16	Medium crop.
Thomas Laxton	July 20	Aug. 12	Poor crop.
English Wonder	" 20	" 12	Medium crop.
Senator	" 30	Sept. 10	Medium crop.
Laxtonian	" 24	" 10	Medium crop.
Duke of Albany	Aug. 14	" 6	Medium crop.
Early Giant (I. H. Seed)	July 24	" 10	Medium crop.
Dainty Duchess (I. H. Seed)	Aug. 10	" 14	Extra heavy crop.
The Lincoln (I. H. Seed)	" 14	Aug. 30	Extra heavy crop.

Parsley.—One variety, Double Curled, was under test. The seed was sown in the garden on April 16. The crop was excellent and was ready for use from August 12.

Parsnips.—Two varieties were tested. The seed was sown in the garden on April 16 and the crop taken up on October 8. Intermediate is the most suitable variety for the heavy gumbo soil at this Farm. The roots are shorter than Hollow Crown which makes them easier to dig.

Variety.	Yield Per acre.		Remarks.
	Bush.	Lb.	
Hollow Crown	442	43	Yield medium, quality poor.
Intermediate	493	34	Yield medium, quality good.

Peppers.—Two varieties, Ruby King and Cayenne, were under test. The seed was sown in the hot-house on March 25. Good strong plants were produced but none bore any fruit during the season.

Radish.—Three varieties, Chartier Large, Early Scarlet White Tipped Turnip, and French Breakfast, were under test. All gave a good crop and can be recommended as suitable varieties for this part of the province.

Squash.—Nine varieties were under test. The seed was planted in the garden on June 1 but, owing to summer frosts, the vines were severely checked on several occasions and the crop was not satisfactory. Early White Bush Scalloped, Long White Marrow, and Crookneck were the only sorts that gave any crop.

INDIAN HEAD.

Salsify.—One variety, Long White, was under test. The seed was sown in the garden April 16, and the roots were ready for use by September 14. The crop was taken up on October 14, and was quite satisfactory.

Turnips.—Eight varieties were under test for table use. The seed was sown on May 8, and the crop was taken up on October 9. Below is given a list of those under test and the yield per acre.

Variety.	Yield Per acre.		Remarks.
	Bush.	Lb.	
Carter Invicta	1040	36	Quality extra good.
Bangholm Swede	629	12	Quality good.
Best of All	605	..	Quality good.
Skirving Purple Top	556	36	Quality good.
Hall Purple Top	536	58	Quality good.
Favorite	520	18	Quality medium.
Sutton Purple Top	508	12	Quality medium.
Westbury Purple Top	435	36	Quality medium.

Tomatoes.—Twelve varieties were under test. The seed was sown in the hot-house on March 18 and plants were set out in the garden on June 7. The vines were severely checked by frost on several occasions during the season. This kept the fruit late and very little ripened on the vines. The crop of green fruit was large and quite satisfactory. The vines which were left unpruned gave a much larger yield than those pruned to several stems. A number of experiments were tried in ripening green fruit. The most satisfactory was found to be where partly coloured tomatoes were placed in an air-tight box and kept in a cool place. The varieties under test are given below.

Variety.	Weight of green fruits from 5 pl.	Remarks.
	Lb.	
Prosperity	14	Medium crop.
Bolgiano Extra Early IXL	23	Good crop.
Florida Special	13	Medium crop.
Rennie XXX Earliest Round Scarlet	19	Good crop.
Line Bred N Adirondack grade No. 1	17	Good crop.
Bonny Best	13	Medium crop.
Johnson Jack Rose	11	Small crop.
Chalk Early Jewel	9	Poor crop.
Sunnybrook Strain Earliana	22	Good crop.
Alacrity	13	Medium crop.
Ponderosa	13	Medium crop.
Yellow Plum	16	Large crop.

Pumpkins.—Three varieties, Large Field, Mammoth and Sweet or Sugar were under test. The seed was sown in the open on June 1. Large Field gave a good crop. The other varieties did not mature.

Rhubarb.—Victoria, Tobolsk, and Strawberry are the varieties under test. All gave a fair yield during the season.

An experiment in forcing roots in the cellar was tried out during the winter. Twelve roots were dug on November 3 and immediately placed in earth in the cellar.

Twelve more roots were also dug on November 3, and allowed to remain outside until frozen solid. These were also placed in the cellar. The first lot gave very poor returns. The second lot that had been allowed to freeze gave a good crop from December 9 until March 1, when roots were removed to make room. Three-year old roots are the best to use for winter forcing.

ORNAMENTAL GARDENING.

TREES, SHRUBS, AND HEDGES.

Trees.—As usual, ornamental trees made a good growth during the season. Insect pests were prevalent on the Experimental Farm, and were also reported from all parts of the province. The larvæ of the fall canker worm defoliated a number of native maple trees in the avenues before being checked by spraying with arsenate of lead diluted with water. Later the trees were again attacked by the green aphis which necessitated spraying all the avenues and hedges with nicotine sulphate diluted with water.

Flowering shrubs were badly checked by late spring frosts, and, with the exception of caraganas and a few late lilacs, no bloom was formed.

Hedges.—There are about thirty specimen hedges on the grounds. These are kept trimmed during the summer in order to show their suitability for ornamental work. Where a low thick hedge is required we recommend the Siberian Pea Tree (*Caragana arborescens*), native choke cherry (*Prunus virginiana*), Manitoba maple (*Acer Negundo* and common lilac (*Syringa vulgaris*). The blue spruce (*Picea pungens*), white spruce (*Picea alba*), and balsam fir (*Abies balsamea*) are suitable for a high, close hedge.

HERBACEOUS PERENNIALS.

Judging from the large correspondence received at this office in regard to horticulture, the residents of the province are giving more attention to beautifying the home surroundings than ever before. Ornamental trees and shrubs are being planted, lawns established, and perennial flowers set out. The latter, once a bed or border is established, require very little further attention and where a proper selection of varieties is made, bloom may be had from May to October.

PERENNIAL FLOWERS.

Variety.	In Bloom. From	In Bloom. To	Remarks.
Aquilegia—S. N. 601	June 10	Aug. 5	Very fine showing.
Aquilegia, Long Spurred White	" 2	" 5	"
Aquilegia superba O. S. N. 159	" 10	" 5	"
Aquilegia canadensis	" 8	June 28	"
Aquilegia, Rose Queen, O. S. N. 1038	" 8	Aug. 6	"
Aconitum, Monks Hood	July 22	" 26	Good showing of bloom.
Achillea, The Pearl	" 2	Sept. 20	" "
Campanula	" 24	Aug. 30	" "
Clematis, O. S. N. 145	June 10	July 24	" "
Campanula latifolia macrantha	July 6	" 24	" "
Crocus	April 28	May 12	Fair " "
Dianthus	July 24	Aug. 30	Good " "
Delphinium, O. S. N. 79	" 22	" 30	" "
" Carmen	" 14	" 30	" "
" Duke of Connaught	" 14	" 28	" "
" O. S. N. 916	" 22	Sept. 23	" "
Dianthus montanus, O. S. 920	June 20	Aug. 28	" "
" *glaucus*, O. S. 419	" 18	" 4	" "
" *Heddewigii*	July 5	Oct. 4	" "
Dictamnus Fraxinella	June 26	July 20	" "
" *albus*	" 12	" 16	" "
Dicentra spectabilis (Bleeding Heart) O. S. 21	May 28	June 24	Medium showing of bloom.
German Iris, Edith	June 24	July 14	Good " "
" Rembrandt	" 8	June 20	" "
" Mme Chereau	" 10	" 26	" "
" Maori King	" 17	July 4	" "
" Shakespeare	" 20	" 4	" "
" Plicata	" 24	" 25	" "
" La Tendresse	" 22	" 12	" "
" Queen of May	July 6	" 30	" "
" Spectabilis	June 10	June 30	" "
" Mrs. H. Darwin	" 24	July 12	" "
Gypsophila, Chalk plant, O. S. 20	Aug. 5	Sept. 24	Medium showing of bloom.
Gaillardia, O. S. 935	July 18	" 24	Good showing of bloom.
" O. S. 936	" 26	" 20	" "
Hemerocallis Dumortierii	" 30	Aug. 26	" "
" *flava*	" 30	" 26	" "
" *Middendorffii*	" 10	" 6	" "
" Florham	" 20	" 26	" "
Helianthus, Sunflower	" 30	Oct. 4	" "
" Miss Mellish	Aug. 24	Sept. 28	" "
" *Maximiliani*	" 16	" 28	" "
Lilium elegans	July 4	July 22	" "
Lychnis, O. S. 931	June 30	Aug. 19	" "
Lychnis, Scarlet	" 9	July 15	" "
Laburnum, O. S. 908	May 30	" 28	" "
Perennial Phlox, Von Hochberg	Aug. 16	Sept. 24	" "
" Jeanne d'Arc	" 16	" 29	" "
" R. P. Struthers	" 16	" 2	" "
Paeony, Globosa Grandiflora, O. S. 920	July 9	July 30	" "
Paeony, Eclatante, O. S. 921	" 9	" 30	" "
" Victor Lemoine, O. S. 930	" 5	Aug. 4	" "
" Delache, O. S. 933	" 10	July 30	" "
Papaver orientale, Goliath	June 26	" 9	Very fine showing.
" Royal Scarlet	" 20	" 12	" "
Perennial Geranium, *G. platypetalum*	July 4	" 28	" "
" *G. sanguineum album*	" 30	Aug. 4	" "
Platycodon grandiflorum, O. S. 7251	Aug. 4	Sept. 4	Good showing of bloom.
Rudbeckia, Newmani	" 16	" 20	" "
" Rays of Gold	" 19	" 24	" "
" Golden Glow	" 14	" 24	" "
Symphytum (Comfrey)	July 8	" 28	" "
Sweet William	" 14	Aug. 26	" "
Siberian Iris, 5 varieties	June 8	July 30	" "
Trollius, Orange Globe	May 30	June 18	" "
Thalictrum adiantifolia	July 12	July 22	" "
Veronica	" 14	Oct. 4	" "

ANNUAL FLOWERS

The annual flower beds were well up to the average this past season. Owing to dry weather and summer frosts a number of varieties were checked and did not come into bloom as early as usual but through August and early September the showing was unusually fine.

Asters, which have been affected with rust for the past two summers, were free from disease this season and gave a show of bloom equal to anything that has been had in past seasons.

Sweet peas were late in blooming but eventually gave a magnificent show of bloom which lasted up to October 7, when all flowers were destroyed by frost. The table below gives a list of a number of the best annuals under test this season.

Variety.	In bloom. From	To	Remarks.
Asters, 29 varieties	Aug. 2	Sept. 30	Very fine bloom.
Abronia umbellata	July 30	" 16	Good showing.
Alonsoa compacta	Aug. 7	Oct. 8	"
Alyssum, Little Dorrit	July 30	" 14	"
Antirrhinum, 6 varieties	" 24	" 16	"
Arctotis grandis	Aug. 2	Sept. 20	"
Alyssum, sweet, I. H. Seed	July 26	" 30	"
Balsam, Sutton mixed	" 8	" 11	"
Bartonia aurea	" 20	" 11	"
" I. H. Seed	Aug. 4	Oct. 6	Very fine showing.
Browallia Elata, blue	July 20	Sept. 28	Good showing.
Calendula officinalis,	June 30	" 20	"
" Orange King	" 30	" 20	"
Candytuft, Sutton, Improved carmine	Aug. 14	Oct. 14	"
Candytuft, Sutton, White Rocket	July 30	" 6	"
Celosia, Giant Mixed	Aug. 6	Sept. 11	"
Coruflower, Mixed	July 28	" 11	"
Clarkia, International prize	Aug. 5	" 20	"
Cockscomb, Dwarf crimson	July 9	" 11	"
Coreopsis, Mixed	" 7	" 20	"
Cosmos, I. H. Seed	June 30	" 11	"
Candytuft	July 28	Oct. 6	"
Dianthus Heddewigii, single	Aug. 6	" 16	"
Eschscholtzia	" 4	" 6	"
Godetia, Double Crimson	" 24	Sept. 20	"
" Bridesmaid	" 24	" 20	"
" Mixed	" 18	" 20	"
Jacobaea, Double Mixed	" 9	" 26	"
Larkspur, 3 varieties	July 28	" 20	"
Lavatera rosea splendens	Aug. 22	" 20	"
Lobelia	June 30	" 11	"
Lupinus, Annual Mixed	Aug. 16	Oct. 6	"
Larkspur, Annual, I. H. Seed	July 30	Sept. 28	"
Malope, Mixed	Aug. 16	Oct. 4	"
Marigold, Double French	July 28	Sept. 11	"
" Single French	" 4	" 11	"
Mignonette, Sweet scented	Aug. 2	" 20	"
Mimulus, Fine Mixed	July 5	" 11	"
Nasturtium, 9 varieties	June 20	" 11	"
Nemesia, Mixed Colours	July 9	" 6	"
" I. H. Seed	" 9	" 6	"
Nicotiana affinis, hybrids	" 14	" 11	"
Pansy, Brilliant Mixture	June 28	Oct. 19	"
Petunia, Mixed Varieties	July 9	Sept. 20	Very fine showing.
Phlox Drummondii, 6 varieties	June 30	Oct. 6	" "
Portulaca, improved double	July 18	Sept. 11	Good showing of bloom.
Poppy, Shirley	Aug. 4	" 20	" "
Pansy, I. H. Seed	June 28	Oct. 19	" "
Petunia, I. H. Seed	July 5	Sept. 20	" "
Phlox Drummondii, I. H. Seed	June 28	Oct. 6	" "
Rudbeckia	July 20	" 4	" "
Salpiglossis, Large-flowered	" 14	Sept. 28	" "
Salvia, Summer Flowering	" 22	" 11	" "
Schizanthus, large-flowered hybrids	" 6	" 20	" "
Stocks, Perpetual Perfection	" 2	" 16	" "
" Improved Dwarf, 6 varieties	June 29	" 20	" "
Swan River Daisy, Star Blue	July 14	" 28	" "
Sweet Sultan, Mixed	Aug. 4	Oct. 5	" "
" Giant Mixed	" 4	" 5	" "
Tagetes signata pumila	July 5	Sept. 14	" "
Verbena, Mixed	" 12	" 20	"
Viscaria cardinalis	Aug. 18	" 20	" "
Zinnia, Giant Double mixed	June 30	" 11	" "
" Sutton Fireball	" 30	" 11	" "

EXPERIMENTAL STATION, ROSTHERN, SASK.

REPORT OF THE SUPERINTENDENT, WM. A. MUNRO. B.A., B.S.A.

WEATHER CONDITIONS, CROP NOTES, AND METEOROLOGICAL RECORDS.

The winter of 1914-15 was comparatively mild and scarcely more snow fell than sufficient to make good sleighing. As a consequence there was little spring flood and little time between the departure of snow and spring tillage.

The hotbeds were started early in April and the ground was in shape in the open about the middle of April. A good start was made in all the annual vegetables and flowers and little interruption was met with due to bad weather. After the opening of spring very little rain fell, the total rainfall for the growing season being the lowest in five years. On June 12 the temperature went down to 24° F., which killed the tomatoes and vine plants, injured a large number of blossoms of the small fruits, cut off the potatoes, and killed the corn. On August 25 the temperature went down again to 31° F., which froze the corn and potatoes again. As a consequence of the exceptionally dry season and of the unusually late spring and early autumn frosts the results in horticulture were less satisfactory in 1915 than for any previous year. The beans, corn, cucumbers, melons, squash, and pumpkins gave no yield and the results tabulated in tomatoes are from plants that were planted in the open after June frosts.

Following is the meteorological record for the year:—

WEATHER Observations taken at Rosthern Experimental Station, 1915.

Month.	Temperature F.			Total Precipitation.	Total Sunshine.
	Highest	Lowest.	Mean.		
	Degree.	Degree.	Degree.	Inch.	Hour.
January	30·3	−45·5	0·2	0·60	103·6
February	29·0	−13·3	8·8	0·50	134·7
March	43·0	−14·8	17·7	1·00	190·6
April	71·3	15·7	44·6	0·30	242·1
May	78·8	23·4	51·2	1·15	297·8
June	81·0	24·2	54·7	1·00	219·9
July	84·2	35·8	58·5	3·12	246·0
August	93·6	31·2	64·2	0·28	319·4
September	79·1	11·8	46·2	1·07	107·8
October	67·1	19·4	40·0	0·32	171·7
November	47·5	−16·6	18·7	0·95	119·9
December	28·0	−20·5	6·8	0·82	83·2
Total	....			10·11	2,236·7
Average for years 1911, 12, 13, 14				16·24	2,201·4
Total for five growing months April to August, 1915				5·85	1,323·2
Average for five growing months, 1911, 12, 13, 14				10·62	1,269·9

PRECIPITATION for the past five growing seasons, April 1 to August 15.

Month.	Year.					Average 5 years. 1911-15
	1911	1912.	1913.	1914.	1915.	
	Inches.	Inches.	Inches.	Inches.	Inches.	Inches
April	0·86	0·67	0·26	0·63	0·30	0·54
May	2·38	2·15	1·26	1·96	1·15	1·78
June	3·55	2·81	1·87	2·00	1·00	2·25
July	2·89	5·25	3·80	1·40	3·12	3·29
August	0·43	0·23	2·24	0·13	·02	0·26
Total	10·11	11·11	9·43	6·12	5·59	8·49

VEGETABLES.

Potatoes.—Owing to the combined effects of late and early frosts and to the continued dry weather the yields of potatoes at this Station in 1915 were the lowest of any year since the Station was established in 1909.

Twenty varieties of potatoes were under test this season but the order of yield was very different from what it had been for the previous five years. These were planted May 6, frozen to the ground on June 15 when they were about six inches high, and frozen again on August 24, when the leaves were destroyed, and frozen to the ground on September 11. This left a growing season of ten weeks as compared with one of fifteen weeks in an average year.

Early Ohio was second highest this year and Bovee was seventh. The only other two seasons they were tried they were nearly the lowest. Following is the yield for 1915 and the average yield for five years of those varieties that have been under test during that period. The yields by acre are estimated from the crop obtained from five rows two and one half feet apart and 78 feet long, of each variety.

Variety.	Colour.	Yield 1915 per acre.	Average for 5 yrs. per acre.
		Bush.	Bush.
Everett	Pink	275	498
Early Ohio	"	265	.....
Reeves Rose	"	259	435
Rochester Rose	"	252	491
Vick Extra Early	Pink and White.	251	428
Moneymaker	White	245	488
Bovee	Pink	240	.....
Irish Cobbler	White	232	370
Rawlings Kidney	"	227	496
Dreer Standard	"	219	512
Empire State	"	215	437
Late Puritan	"	213	438
Dalmeny Beauty	"	210	426
Vermont Gold Coin	"	205	.....
Bermuda Early	Pink	195	.....
Carman No. 1	White	195	386
Wee MacGregor	"	195	.....
Canadian Standard	"	193	.....
Burbank Seedling	Pink	186	.....
Table Talk	White	161	.....

Three plots of Wee MacGregor were given different kinds of cultivation with the following results:—

Three cultivations: July 2, 9, and 16. Left level	261	bush. per acre.
Five cultivations: July 2, 9, 16, 23, and 30. Left level	288	" "
Four cultivations: July 2, 9, 16, and 23, and hilled July 30	254	" "

The average yield of hilled versus unhilled for the four previous years was:—

Hilled	414	bush. per acre.
Unhilled	437	" "

Morgan Seedling potatoes were planted at different dates with the following results:—

May 7	271	bush. per acre.
" 15	233	" "
" 23	235	" "
June 18	131	" "

Different depths of seeding have been tried for the past four years with the following results:—

Depth.	Bushels per acre.			
	1912.	1913.	1914.	1915.
2 inches deep	465	531	391	270
4 "	659	540	297	288
6 "	775	526	276	291
4 " and subsoiled	789	.....	.....	281

Potatoes have been planted at different distances apart with the following results for the past four years:—

	Bushels per acre.			
	1912.	1913.	1914.	1915.
12 inches between plants, and 30 inches between rows	557	505	271	287
14 " " 33 " "	609	528	242	273
15 " " 36 " "	570	394	242	223

Beets.—Six varieties of table beets were sown on May 3 and harvested on September 14 with the following results from a row 30 feet long:—

Variety.	Lb.	oz.
Ruby Dulcet	68	4
Cardinal Globe	88	4
Eclipse	51	4
New Meteor	68	8
New Early Black Red Ball	52	4
Crosby Egyptian	79	4

Carrots.—Four varieties of carrots were tested. Half Long Chantenay along with being the highest yielder was one of the best in point of quality. These were sown on May 4, thinned toward the end of June, and ready for use by the end of July. Following is the yield from a 30-foot row:—

Variety.	Lb.	oz.
Improved Nantes	47	8
Half Long Chantenay	55	10
Early Scarlet Horn	31	15
Improved Danvers Half Long	49	12

Turnips.—Eight varieties of turnips were tested for the table, but swedes proved to be more desirable for culinary purposes than the white turnips, especially so when keeping qualities are considered. These were sown on May 5 and ready for use early in August. Following is the yield from a 30-foot row:—

Variety.	Lb.	oz.
Westbury Purple Top	26	9
Best of All	23	3
Hall Purple Top	30	3
Bangholm Purple Top	27	4
Favorite	20	13
Carter Invicta	46	11
Sutton Purple Top	24	8
Skirving Purple Top	28	15

Cauliflower.—The varieties tested in cauliflower in 1915 were not satisfactory where yield alone is considered, because the early varieties were ready to mature when the season was the driest and instead of maturing, withered. Any of the four following varieties are satisfactory under general conditions. The yields are from one row 30 feet in length of each:—

Variety.	Lb.
Early Snowball	22
Extra Selected Early Dwarf Erfurt	14
Danish Giant Dry Weather	4
Veitch Autumn Giant	1

Some varieties of cauliflower were sown in the open, but were affected with root maggot and those that survived this trouble succumbed to the dry weather.

Cabbage.—Cabbage has done well ever since the Station was established, although the yield in dry seasons is not equal to that in normal seasons. The plants were started in the hotbed at the end of March and planted in the open on the 17th of May and were ready for use from the middle to the end of July. Following is the list of the varieties tested with the weight of ten average heads:—

Variety.	Lb.	oz.
Nofalt	71	6
Early Jersey Wakefield	38	0
Paris Market (very early)	24	4
Copenhagen Market	64	13
Danish Summer Ballhead	43	14
Flat Swedish	51	10
Extra Amager Danish Roundhead	59	6
Improved Amager Danish Roundhead	40	6
Fottler Improved Brunswick	42	13

Celery.—Seven varieties were tested. This is one of the most difficult vegetables to start, the seed being small and slow to germinate. In this case the seed was sown in pots in the house and on the 1st of April when the hotbed was ready they were plunged in the hotbed. They were transplanted from the pots to the hotbed on the 22nd of May

ROSTHERN.

and planted in the open on the 21st June. Following is the weight of plants from a fifteen foot row of each variety:—

Variety.	Lb.	oz.
Paris Golden Yellow	32	10
Giant Pascal	36	3
White Plume	17	8
Evans Triumph	29	10
Noll Magnificent	40	2
French Success	28	2
Improved White Plume	27	9

We have tried planting celery in trenches and on the level and in every case found more satisfactory results from planting on the level. In both cases there was a deep, rich seed-bed.

Several methods were tried in the bleaching of celery namely: with earth, boards, and felt roofing. Banking with earth involved the most labour. Banking with boards and felt roofing involved about the same amount of labour, but the boards were more easily kept up close to the plants. The roofing, however, is inexpensive, easy to store, and with the use of long wires in the form of staples, could be made to stand up close to the plants. The roofing is sold in rolls 12 inches wide.

Onions.—Thirteen varieties of onions were sown in the open on the 5th of May, germinated on the 22nd, were thinned on June 14, and ready for use by the 15th of September. Following is the table showing the names of varieties, weight in a 30-foot row, of the good onions, and of the thick-necks:—

Variety.	Good Onions. Lb.	oz.	Thick-necks. Lb.	oz.
Johnson Dark Red Beauty	5	13	3	2
Salzer Great Red Wethersfield	8	13	2	11
Red Globe	4	8	7	6
White Globe	8	11	5	6
Danver Yellow Globe	7	15	5	7
Large Red Wethersfield	9	12	3	8
Australian Brown	6	10	0	9
Early Flat Red	9	6	2	10
White Early Barletta	9	13	1	9
White Queen	7	10	0	0
Very White Pearl	9	1	0	7
Rennie Extra Early Red	8	2	1	10

An experiment was tried in thinning onions. In all cases the rows were 33⅓ feet long. Following is the table showing the results:—

Variety.	Marketable. Lb.	oz.	Thick-necks. Lb.	oz.
Extra Early Red. Thinned 1-in. apart	12	12	0	8
" 2-in. "	5	7	1	4
" 3-in. "	2	4	2	5

Tomatoes.—Five methods of ripening tomatoes were tried as follows: placing the green fruit in a window in the sun; placing it in the shade; placing it in a closed box; placing it in a pile covered with straw; hanging the plants in a cellar. It was found that where the tomatoes were nearly ripe, those did best that hung on the plants in the cellar, but where the tomatoes were quite green best results were obtained by placing in a closed box, or placed in a pile covered with straw. Tomatoes ripened on the plants retain their flavour better than those ripened off the plants.

ORNAMENTAL PLANTS.

ANNUAL.

Asters.—The asters for this experiment were transplanted at the same time as those in the open and were mulched with light manure to a depth of 2 inches. A wooden frame with cheesecloth top was erected over them.

There was very little withering or yellowing evident on any of the asters this year (1915) but those under the shade frame were entirely free from it.

Among the best varieties of asters are to be mentioned: Sutton Victoria Mixed, Sutton Primrose Queen, Sutton Giant French Mixed, Ray Asters, Sutton Giant White. They began to bloom about the middle of August and continued until cut off by frost.

Upwards of two hundred varieties of flowers were tried in the border which bounds the lawn, the more important of which are tabulated as follows:—

Kind.	Where sown.	Date sown.	Time of transplanting.	Flowering period.
Bartonia aurea	Open	May 6		July 7—Sept. 10.
Calendula	Open	May 6		July 18—Sept. 10.
Candytuft	Open	May 6		Aug. 20—Sept. 10.
Carnation	Hotbed	April 4	June 8	Aug. 28—Sept. 10.
Cornflower	Open	May 16		July 20—Aug. 25.
Chrysanthemum, annual	Hotbed	April 3	June 10	June 15—Sept. 9
Clarkia	Open	May 6		July 12—Sept. 12.
Coreopsis	Hotbed	April 3	June 10	July 13—Sept. 10.
Cosmea	Hotbed	April 3	June 10	July 7—Aug. 30.
Daisy, Sutton double mixed	Hotbed	April 5	June 11	July 17—Sept. 10.
Dianthus	Hotbed	April 5	June 11	July 2—Sept. 5.
Eschscholtzia	Open	May 5		July 17—Aug. 23.
Gaillardia	Hotbed	April 8	June 10	July 10—Sept. 10.
Godetia	Open	May 5		July 28—Aug. 25.
Kochia (Summer Cypress)	Hotbed	April 3	June 8	Aug. 8—Aug. 30.
Larkspur	Open	May 5		Aug. 8—Sept. 10.
Lobelia	Hotbed	April 4	June 8	July 15—Sept. 10.
Marigold	Hotbed	April 3	June 10	July 4—Sept. 10.
Mignonette	Open	May 5		June 15—Aug. 28.
Nasturtium	Open	May 6		Aug. 10—Sept. 10.
Nemesia strumosa Suttoni	Hotbed	April 3	June 11	July 15—Sept. 10.
Nicotiana	Hotbed	April 5	June 9	July 12—Aug. 30.
Pansy	Hotbed	April 5	June 7	July 10—Sept. 10.
Petunia	Hotbed	April 5	June 9	July 12—Sept. 10.
Phlox Drummondii	Hotbed	April 3	June 9	July 2—Sept. 10.
Portulaca	Hotbed	April 5	June 12	July 20—Sept. 10.
Shirley Poppy	Open	May 6		July 20—Aug. 30.
Double Carnation Poppy	Open	May 6		July 28—Aug. 30.
Salpiglossis	Hotbed	April 3	June 9	July 20—Sept. 10.
Stock	Hotbed	April 3	June 9	July 4—Sept. 10.
Sweet Sultan	Open	May 6		July 24—Sept. 10.
Verbena	Hotbed	April 3	June 9	July 7—Sept. 10.

We have collections of sweet peas which were obtained from Sydenham, and Burpee. These were sown on May 6, began to bloom early in August, and continued until the first hard frost on September 10.

Home grown flower seeds.—The seed has been saved from the following list of flowering annuals from 1914, and proved quite as satisfactory as that obtained from the seed houses: Fourteen varieties of antirrhinum, chrysanthemum, cosmea, schinzanthus, verbena, three varieties of coreopsis, four varieties of stock.

Tulips.—Every year there is received from Holland a shipment of several thousand tulip bulbs, most of which are planted in the border immediately, which is usually

September or October. These are watered and covered with straw and left until spring. They furnish a magnificent display of early bloom and die off in time to allow for asters and geraniums to be planted for later bloom the same season. The same bed of tulips does well for two years and in some cases three years.

Besides the tulips planted out of doors, several hundred are potted and stored in the cellar. They are kept in the dark and watered as often as they show considerable dryness. As the cellar here is rather dry the tulips are watered about every three weeks. About the time of the Christmas holidays, a few of the more forward plants are removed to a shaded place in the house, watered and left for a few days and then removed to more light and watered, and in the course of a couple of weeks open into flower. Before these have done blooming, others are brought and so a succession of flowering tulips is kept up until Easter.

TREES AND SHRUBS.

Starting a Hedge or Windbreak.—Many more applications are made to the Station for a start in young trees and shrubs than the Station can supply. Nearly every application is for a tree or shrub to set out. If it could be realized how much more easily and quickly a tree can be started from a seed or a cutting than young trees from two to four feet high, there is no doubt that the applications would be for seeds and cuttings rather than for trees.

In 1912 it was decided to start a caragana hedge quickly, and in order to hasten matters two-year old plants were obtained in good condition from the Experimental Station at Lacombe, and at the same time we planted caragana seed in a nursery row. At the end of the season of 1913 the plants in the nursery row were as tall as those in the hedge, and at the end of the season of 1914, which indicated three seasons' growth in every case, those planted from the seed in 1912 and left in their original places were all taller than those two year old plants planted at the same time, and they showed a great deal more foliage, and were in every way more desirable plants. The same results have been shown repeatedly in the case of Manitoba maple, and also in Russian poplar. If Russian poplar cuttings are placed where the tree is wanted to grow the resulting tree will be larger at the end of the season than will a two year old tree transplanted at the same time the cutting was planted. Besides the actual advantage of quicker growth and stronger tree, there is the added advantage of saving of expense by shipping sets of cuttings, and the saving of labour in planting the seeds or the cuttings instead of planting the trees.

For shade trees there is perhaps no quicker growing trees for the purpose than a number of varieties of Russian poplar. This species is propagated very easily by means of cuttings and frequently makes over three feet of growth in a single season. For a windbreak any of the number of varieties of willow propagated by means of cuttings is satisfactory as well as the Manitoba maple propagated by means of seeds.

For hedges, the caragana propagated by seed, and the laurel-leaved willow propagated by cuttings, are, perhaps, the most satisfactory.

Of the ornamental shrubs the most easily cared for are the Tartarian honeysuckle, *Rosa rugosa*, and many of the large number of varieties of lilac. All of these are slow to propagate and young plants may be had from any of the well recommended nurseries and occasionally from the Experimental Stations.

Native spruce and larch were obtained in their natural location north of Duck lake in the seasons of 1911-12-13. These plants were of heights varying from 1 to 6 feet, and out of nearly three hundred trees less than ten died. In transplanting the spruce very special care was exercised to prevent the roots becoming dried. On the wagon bottom was placed moss to a depth of about 4 inches which was thoroughly soaked with water. As much earth was left with the young tree as the root would carry, and the trees were placed in the wagon as soon as lifted. Frequently during the

process of loading, water was poured on the trees, and again on the way home wherever opportunity afforded, water was again applied to the roots. The next day holes were dug larger than necessary to merely hold the roots and water was poured in. A tree was lifted from the wagon and placed in the hole to such a depth that when the ground was placed around the tree, the tree was about two inches farther into the ground than it had been in its original environment. The ground was tramped very tightly around the tree and water was poured on again. Several times during the first season the trees were again watered.

The Arboretum.—Upwards of seven hundred trees and shrubs were planted in a border on the north and west sides of the horticultural ground and careful record is being kept of their growth and relative merits. Planting was begun in 1910 and new specimens are being added every year.

SMALL FRUITS.

With the exception of gooseberries, the yield of small fruits in 1915 was smaller than in any previous year. This was principally due to the dry weather. The drought was not felt directly so much as indirectly on the plants because of the conditions thus made favourable for the development of noxious insects and particularly of aphids on the currant bushes. Although spraying was carried on the results were not satisfactory owing to the immense numbers of these small insects.

Although gooseberries have been tried every year since the establishment of the Station, this was the first season that a yield was obtained, which, although in itself not large, establishes a record. Of course the plants are very small. Six bushes of Carrie yielded five standard berry boxes of fruit. Six bushes of Houghton yielded twenty-six standard berry boxes.

The following is a table showing the principal varieties of black, red, and white currants, and raspberries together with their yields in 1915. The yields are given in terms of standard berry boxes holding approximately one pint.

SMALL FRUITS.

Variety.	Year planted.	No. of plants.	Total yield.	Yield per plant.
			Boxes.	Boxes.
Black Currants.				
Clipper	1911	6	13	2
Victoria Black	1911	6	20	3⅓
Eagle	1911	6	32	5⅓
Topsy	1911	6	21	3½
Lee Prolific	1911	6	30	6
Red Currants.				
Red Grape	1911	5	15	3
Rankins Red	1911	6	20	3⅓
Raby Castle	1911	6	46⅙	7⅙
Stewart	1911	6	25	4⅙
White Currants.				
White Cherry	1911	6	18	3
Raspberries.				
Turner	1911	12	28	2⅓
Loudon	1911	12	32	2⅔
Sunbeam	1911	12	38	3
Herbert	1912	4	9	4¼

Strawberries.—Proper winter protection seems to be the limiting factor in strawberry culture. The plan followed at Rosthern is to cover with loose straw to a depth of nearly a foot. The straw is held in place by means of poles laid directly above the rows of strawberries.

ROSTHERN.

In the first three seasons of our experience we uncovered the strawberries early in spring and the plants grew splendidly, but bore no fruit. During the last three seasons the mulch has been left on until the end of May with the result that there has been fruit every season. In some places where the mulch was thicker than it should have been the plants smothered. The critical time in the development of the fruit is at the blossom stage. A very slight frost kills the bud or blossom and if the mulch is left on until the danger from frost is over, the blossoms develop without injury and fruit is the result. Owing to the severe frost on June 12, many of the buds were killed, but sufficient survived to produce a fair crop.

The three varieties that have done best at Rosthern are the Dakota, Warfield, and Senator Dunlap.

TREE FRUITS.

Apples.—The seedling apples started from Manitoba grown apples and from seed grown at Ottawa came through the winter of 1914-15 in good condition and made satisfactory growth throughout the season. There are upwards of five thousand of these trees and from these we hope to be able to select an apple suitable to this climate.

Many of the apple trees that have been planted for three, four, and five years came into luxuriant bloom, but the bloom was killed by the June frost and no fruit was produced.

Plums.—The same frost that played havoc with the strawberry and apple blossoms killed nearly all of the plum blossoms. The seedling plums secured from Brandon two years ago are making good progress.

EXPERIMENTAL STATION, SCOTT, SASK.

REPORT OF THE ACTING SUPERINTENDENT, MILTON J. TINLINE, B.S.A.

CHARACTER OF SEASON.

The first part of April was cool and cloudy, the latter part much warmer. Strong winds did considerable damage to the fruit and vegetable gardens during the last few days of the month.

May was cool and unsettled, with high winds. By the third week in May, a number of young apple and plum trees were in bloom. The red currant bushes were also a mass of bloom at that time.

Sharp frosts, as late as June 16, damaged beans, potatoes, corn, tomatoes, etc. Rain was recorded on seventeen days, with a total precipitation of 3·74 inches. Early in the month the flowering shrubs were blooming freely. Annual flower seeds, sown in the open, germinated well.

The coolness of the nights was particularly noticeable during both June and July. This retarded the development of some of the more tender kinds of vegetables. Very little precipitation was recorded after July 16.

August was much warmer, with very little rainfall. An excellent crop of small fruits was harvested, while, notwithstanding the dry weather, annual flowers bloomed freely. One degree of frost was recorded on the 23rd, but did very little injury.

The frosts from the 9th to the 14th of September, were unusually severe. The more tender kinds of vegetables were harvested early in the month, but the frost injured vegetables that are usually considered quite hardy, such as beets, onions, etc.

With the exception of a snowstorm on the 6th fine weather was experienced throughout October.

The ground froze up on November 8, and snow fell on the 9th. For the most part the weather during November and December was reasonably mild.

Commencing with January 3, severe winter weather set in; the minimum temperature on the 11th being 55·4° below zero. The cold and stormy weather continued up to the middle of February. The average mean temperature for January being 18·1°. A thaw from the 14th to the 25th of February made a break in a cold winter. From the latter date to almost the end of March the weather continued cold. Somewhat warmer weather was experienced during the last few days of March.

EXHIBITIONS.

An important feature of the exhibit sent out from this Station to the summer fairs, was a collection of small fruits; currants, raspberries, gooseberries, and strawberries which attracted considerable attention. A display of perennial flowers called forth many favourable comments. The fruit and flowers were supplied fresh for each fair, and added greatly to the general effect. As the exhibit was staged at seven central fairs in comparatively new districts, it is hoped that the interest aroused will lead to the addition of fruit and flower gardens to a number of the farm and village homes.

TREE FRUITS.

Experimental work with tree fruits has consisted in testing out varieties of hardy standard apples, seedlings of standard apples, hybrid crab-apples, plums, and cherries. The orchards were first started in 1911, and, as the fruit trees had to be shipped in, they were necessarily only two or three years old when planted. During the past season Robin, Magnus, and Silvia (three varieties of hybrid crab-apples) bore fruit for the first time. Aitkin, Cheney, and native plums bloomed quite freely, but, owing to the strong winds prevailing at flowering time, no fruit set. Several Compass cherries bloomed, and a small quantity of fruit ripened on a Rocky Mountain cherry.

A factor that has contributed to the success obtained with the fruit trees, is the system of caragana hedges planted at the same time the first fruit trees were set out.

While hedges were planted around the outside of both of the orchards, cross-hedges were only planted in one. These cross-hedges run east and west, and are 40 feet apart. Every 20 feet a space was left in the hedges for the fruit trees. Paralleling the cross-hedges and half-way between each pair of hedges, fruit trees were planted 20 feet apart in the row.

The hedges are left untrimmed so as to provide as much protection as possible from the winds, also to hold the snow for winter protection. The moisture obtained from the melted snow, is an important item in the moisture supply for the early summer months.

Considerable loss was sustained by the trees not ripening their wood before the autumn frosts, and freezing back each winter. To overcome this difficulty, rape is sown during the latter part of July. The rank growing rape taking the excessive moisture out of the ground, permits the trees to ripen before the severe weather.

BUSH FRUITS.

The bush fruit garden is protected by caragana hedges. These aid materially by affording protection from the wind, and in holding the snow during the winter.

Thirty varieties of currants are under test; of these, almost all the black varieties and about fifty per cent of the red, have proved hardy. White currants freeze back to a greater or less extent, while winter protection is given the raspberries and gooseberries.

The following is a list of the most productive of the hardiest varieties of currants and raspberries under test:—

Variety.	Bushes.	Size of Fruit.	Yield per acre 1915.
Red Currants—			Lb.
North Star	Large, vigorous.	Very small	4,818
Raby Castle	Vigorous	Medium	4,519
Stewart	Vigorous	Small	4,007
Red Cross	Vigorous	Very large	3,375
Black Currants—			
Kerry	Large, vigorous	Small	10,672
Climax	Large, vigorous	Small	10,236
Saunders	Large, vigorous	Small	9,266
Magnus	Large, vigorous	Large	7,623
White Currants—			
White Cherry	Weak	Medium	490
White Grape	Weak	Medium	272
Large White	Weak	Small	217
Raspberries—			
Sunbeam	Large, vigorous	Small	1,905
King	Small, vigorous	Small	1,502

SCOTT.

Dry warm weather was experienced during the fruiting season of the raspberries; this decreased the yields materially. Four varieties of red raspberries were grown; of these, only the two varieties Sunbeam and King, were grown under comparable conditions. The former is a cross between the native raspberry of South Dakota and a purple cane Eastern berry. It is very hardy, a vigorous grower, and a prolific bearer. The fruit is of medium quality. This variety is recommended for prairie conditions.

The Herbert, if well protected during the winter, will produce satisfactory crops of superior fruit.

The Houghton has proved to be the only satisfactory variety of gooseberries grown on the Station.

Covering raspberry canes and gooseberry bushes with soil has been found the most satisfactory winter protection. Plants not protected usually freeze back very badly.

STRAWBERRIES.

Notwithstanding the June frosts, an unusually heavy crop of strawberries was harvested. Reports received, indicated good crops wherever they were tested throughout northwestern Saskatchewan.

The only varieties on the Station, were Dakota, and a mixed bed of Senator Dunlap and Warfield. The fruit of the Dakota is small and somewhat hard when preserved. The Warfield has a larger and softer berry, while the Senator Dunlap is much to be preferred to either of the others.

New plantations of Dakotas and Senator Dunlaps were set out. The latter were planted in the early spring, and produced vigorous runners. The Dakota, planted late in June, made satisfactory growth.

VEGETABLES.

EXPERIMENTS WITH POTATOES.

The field, on which the tests with potatoes was conducted, was a dark chocolate loam, and had grown field roots and potatoes in 1914. Ten tons per acre of well rotted barnyard manure was applied early in the spring, the land was then ploughed 8 inches deep, packed, floated, and harrowed. The potatoes were planted with the plough, and the soil again packed and harrowed.

POTATOES—TEST OF VARIETIES.

Of the thirty varieties under test, the nineteen given in the following table have been under test for four years:—

Variety.	Size, form and colour.	Yield per acre 1915.		Average Yield per acre 4 years.	
		Bush.	Lb.	Bush.	Lb.
Rawlings Kidney	Large, oval, white	347	36	300	26
Morgan Seedling	" " "	281	36	294	10
Wee MacGregor	" " "	343	12	292	9
Table Talk	" " "	312	24	273	37
Carman No. 1	" " "	329	48	267	18
Dreer Standard	" " "	312	24	264	43
Gold Coin	" " "	301	24	264	2
Money Maker	Large, long, white	299	12	256	30
Rochester Rose	Medium, round, pink	273	12	251	39
Dalmeny Beauty	Large, oval, white	341	..	249	21
Empire State	Large, long, white	314	36	243	27
Irish Cobbler	Medium, round, white	276	48	228	28
Everett	Medium, long, pink	255	12	225	26
Late Puritan	Large, long, white	277	12	223	15
Vick Extra Early	Medium, long, pink	257	26	196	56
Reeves Rose	Medium, oval, pink	291	30	189	28
Hard to Beat	Small, oval, white	180	24	154	59
Factor	Medium, oval, white	272	48	154	34
American Wonder	Small, round, white	118	48	105	48

Owing to the dry weather of the latter part of the summer and to the short growing season some of the late maturing varieties did not yield as well as might be expected. In the cooking test the Everett, and Wee MacGregor proved to be two of the best varieties.

CULTURAL EXPERIMENTS WITH POTATOES

Potatoes were planted at week intervals from May 7, to June 4. The rows were 2½ feet apart. The sets cut to three eyes each, were dropped 1 foot apart in the row.

POTATOES.—Dates of Planting.

Date of Planting.	Total Yield per acre.	
	Bush.	Lb.
May 7	528	.
" 14	360	48
" 21	321	12
" 28	272	48
June 4	255	..

It will be noted that, notwithstanding the June frosts, the earliest planting gave the best yield.

SCOTT.

KIND OF SETS.

In this experiment two types of potatoes were used, one having most of the eyes at the seed end of the tuber, and the other with the eyes more evenly distributed. The following table gives the average of the results obtained:—

POTATOES.—Kind of Sets.

Kind of Sets.	Unmarketable per acre.		Total Yield per acre.	
	Bush.	Lb.	Bush.	Lb
Whole, small potato	24	12	315	42
Cut to one eye	13	12	275	..
Cut to two eyes	17	36	286	..
Cut to three eyes	16	30	324	30

DISTANCES APART IN PLANTING SETS.

In this test both 30 and 36 inches between the rows were tested, also planting the sets 12 and 14 inches apart in the row. The rows that were 36 inches apart, with the sets 24 inches apart, gave the better crop.

HILLING VERSUS LEVEL CULTIVATION.

Hilling potatoes in July was found to increase the yield per acre by 35 bushels, fewer tubers were sunburned, and less damage was occasioned by the early September frosts.

STRAW MULCH.

A straw mulch was placed between the rows of potatoes when the tops were 4 inches high. This plan eliminates the expense of cultivation. A loss of 47 bushels per acre was realised by using the mulch. The crop was badly attacked by common scab, which rendered the tubers useless for seed purposes. On the adjoining plot very little scab was noticed.

COST OF GROWING 1 ACRE PLOT OF POTATOES.

A 1-acre field was planted with potatoes, half with the Gold Coin, and half with the Everett. The seed was planted on May 13, in rows 2½ feet apart, the sets cut to 3 eyes each were dropped 12 inches apart in the row. The field had been manured early in the spring, and ploughed 8 inches deep. It was then packed and harrowed. A plough was used to make and cover the drills. In harvesting, the rows were opened up with one horse on the plough.

The following table gives the total cost of producing the one acre of potatoes:—

Rent of land (one year)	$ 3 00
Barnyard manure (12 tons) at $1 per ton (¼ exhausted in one year)	4 00
Ploughing in early spring (10 hours at 33 cents per hour)	3 30
Packing (⅔ hour at 33 cents per hour)	22
Harrowing twice (1 hour at 33 cents)	33
Making and covering drills (9 hours at 33 cents per hour)	2 97
Seed (25 bushels at 50 cents per bushel)	12 50
Cutting and planting sets (4 men, 9 hours at 19 cents per hour)	6 84
Harrowing and packing after planting (1 hour at 33 cents)	33
Harrowing twice later (⅔ hour at 33 cents per hour)	26
Cultivating three times and hilling (9 hours at 26 cents per hour)	2 34
Ploughing out (1 man and horse, 6 hours at 26 cents per hour)	1 56
Picking up (manual labour, 56 hours at 19 cents per hour)	10 64
Storing (2 men and team, 5 hours at 53 cents per hour)	2 65
Total cost	$50 94

Yield per acre Gold Coin, 227 bushels.
" " Everett, 197 bushels.

OTHER KINDS OF VEGETABLES.

BEANS.

The young bean plants were frosted on July 16, making reseeding necessary. Before the frosts of early September seven varieties were sufficiently advanced for table use. The Wardwell Kidney Wax proved to be the most tender, and to have the best flavour.

BEETS.

Only a medium crop of beets was harvested. Six varieties were grown, the Ruby Dulcet leading in point of yield, with Eclipse second, and Crosby Egyptian third.

CABBAGE.

Ten varieties of cabbage were grown; of these, Nofalt gave the best crop, with Copenhagen Market second. Early Jersey Wakefield, and Paris Market were the first fit for use. Danish Delicatesse gave the heaviest yield of the red varieties.

CAULIFLOWER.

The Danish Giant Dryweather gave 94 per cent of good heads, with an average weight of 3½ pounds per head. The Early Snowball weighed equally well, but only 75 per cent of the heads developed properly.

CARROTS.

Of the four varieties of carrots tested, Half Long Chantenay, and Early Scarlet Horn yielded equally well. In the cooking test Improved Danvers Half Long surpassed all others, having an unusually sweet flavour.

In the cultural test, to determine the best distance apart to grow carrots, it was found that thinning the plants to 1½ inches apart in the row gave heavier yields than wider spacing. The roots from wider distances were more shapely however.

CORN.

Owing to the cool weather of the early summer months, and to the early September frosts, only the following three varieties of corn reached the roasting stage, White Squaw, Extra Early Adams, and Malakoff.

LETTUCE.

The cool, moist weather of the early summer was particularly favourable to lettuce, the several varieties tested continuing fresh and crisp for a lengthy season. Giant Crystal Head was one of the best varieties for table use, being crisp and tender, and of excellent flavour. Hanson Improved was also of good quality.

ONIONS.

The test with onions included thirteen varieties. Owing to the unusually severe frosts in early September, some of the late maturing varieties did not yield as well as was expected. Red Globe gave the heaviest crop, with Dark Red Beauty second. Out of three varieties of pickling onions tested, White Early Barletta yielded the best crop. Extra Early Red had the lowest percentage of thick-necks, with large Red Wethersfield having the highest.

SCOTT.

PARSNIPS.

Two varieties were tested. Intermediate giving the better yield, but Hollow Crown proved the better in the cooking test. In determining the proper distances apart for parsnips, 3 inches was found to produce the heaviest crops.

RADISH.

An excellent crop of Scarlet White Tipped radish was secured, the radish being unusually crisp, and mild in flavour.

TURNIPS.

In addition to the usual test of white turnips, several varieties of swedes were grown for table use. While some were almost as fibrous and strong flavoured as the white kinds, yet Champion Purple Top proved to be mild and sweet in flavour, and of medium texture. Hall Purple Top was second in suitability for table use.

PEAS.

Sixteen varieties of garden peas were grown in the uniform test rows. Additional experiments included testing home-grown seed against imported seed, and testing out sowing four varieties, having different seasons of maturing, against sowing one variety on successsive dates. The object of the latter experiment was to provide a lengthy season for green peas. (Sowing different varieties early in the season, proved the more satisfactory.)

In the variety tests, the seed was sown in rows 2½ feet apart, on April 29. The following table gives the date when the peas were first ready for use, the quantity of green peas harvested in the pod, and the yield of ripened seed secured:

GARDEN PEAS.—Test of Varieties.

Variety.	First Ready for use.	Yield, Green Peas in Pod. 15-foot row	Yield, Threshed Peas. 15-foot row.
		Lb.	Lb.
Advancer	July 30	14½	2¾
American Wonder	" 17	12½	1⅞
English Wonder	" 17	11⅞	2½
Sutton Excelsior	" 25	11½	1¾
Juno	Aug. 5	11½	2¾
Premium Gem	July 17	11¼	2 1/16
Dainty Duchess	" 29	10¾	2
Telephone	Aug. 5	10½	1⅝
Quite Content	July 30	10¼	1 9/16
Stratagem	Aug. 5	10¼	1⅞
Heroine	July 27	9¼	2
The Lincoln	" 30	9½	2⅜
Gregory Surprise	" 14	8¼	1 9/16
Early Giant	" 20	7½	1⅛
Gradus Extra Early	" 27	5⅝	1⅛
Thomas Laxton	" 17	4¾	1 9/16

HOME-GROWN VERSUS IMPORTED SEED.

Variety.	Imported Seed.		Home Grown Seed.	
	First ready for use.	Yield, Green Peas in Pod. 15-foot row.	First ready for use.	Yield, Green Peas in Pod. 15-foot row.
		Lb.		Lb.
Gradus	July 27	5 5 8	July 20	10 1 2
Stratagem	Aug. 5	10 1 4	Aug. 2	13
Telephone	" 5	10 1 2	July 25	12 1 8
Thomas Laxton	July 17	4 5 6	July 17	11 1/4

In addition to the vegetables previously reported on, Brussels sprouts, celery, cucumbers, muskmelons, watermelons, squash, pumpkins, tomatoes, and leeks were tested, but, owing to the unfavourable season, did not become sufficiently advanced to make satisfactory tests.

ORNAMENTAL GARDENING.

THE ARBORETUM.

All the more hardy kinds of trees and shrubs made a vigorous growth, due to the abundance of moisture in the soil. A part of the season's growth was frozen back on some trees by the unusually severe, early September frosts. The amount of damage can only be fully determined when the buds begin to swell in the spring.

Experimental work has consisted in testing out different kinds of trees and shrubs. Forty-eight kinds are under trial, with a total of 371 varieties. No protection is afforded the trees, and artificial watering is not practised.

The flowering shrubs were a particularly interesting feature of the arboretum. A continuous bloom was maintained from early spring until quite late in the summer. *Spiraea arguta* was in bloom on May 10, and continued blooming for a month. By May 21, the Missouri Currants were flowering. Some varieties of the Caragana were in bloom by May 25. June was the month for the lilac, and honeysuckle. Twenty-nine varieties of lilac are under test. The *Syringa chinensis* (Rouen lilac) bore from thirty to forty large clusters of flowers. The *Syringa villosa*, and *Syringa Josikaea* are quite hardy, and bloomed freely. Of the varieties of common lilac, the Congo proved to have the most bloom.

HEDGES.

Twenty-one different kinds of hedges have been set out with a view to determining the most ornamental, and most useful kinds. The laurel-leaved willow, white spruce, lodge pole pine, and Josika's lilac have grown splendidly. The *Caragana arborescens* has proven to be very hardy, and has been extensively used on the Station. The young plants growing up around the base of the tree give a dense bottom, and the numerous branches provide an almost impassible hedge and a splendid wind-break.

HERBACEOUS PERENNIALS.

The border of perennial flowers was augmented by the addition of a collection of iris received from the Brandon Experimental Farm, and a number of plants of various kinds that had been grown in the seedling beds on the Station.

SCOTT.

A collection of pæonies planted in the autumn of 1912, and spring of 1913, bloomed for the first time. Twenty-one varieties made an excellent showing and were the admiration of the visitors. Hollyhocks, daffodils, and Canterbury bells, that are usually considered not sufficiently hardy, bloomed quite freely. The Canterbury bells in particular, were magnificent.

The following is a list of perennial flowers that appear sufficiently hardy to warrant recommending:—*Aquilegia* (Columbine), *Dianthus montanus* (Pinks), *Dianthus barbatus* (Sweet William), *Delphinium* (Perennial Larkspur), *Gypsophila paniculata* (Baby's Breath), *Hesperis matronalis* (Sweet Rocket), *Iris*—German and Siberian (Flags), *Lupinus* (Lupine), *Lychnis chalcedonica* (Maltese Cross), *Pæonia* (Pæony), *Papaver nudicaule* (Iceland Poppy), *Papaver orientale* (Oriental Poppy), *Polemonium* (Jacob's Ladder).

BULBS.

The tests with varieties of tulips have been continued. Thirty-four varieties were tried. The collection of tulips included both single and double varieties, also a considerable number of Darwin or late flowering tulips, and two varieties of the Parrot type. In as far as the past season's experiments were concerned Pottebakker White, Duchesse de Parma, Chrysolora, and Proserpine proved to be the best early single sorts. Couronne d'Or was one of the best double tulips. Baronne de la Tonnaye was one of the most vigorous growing and free blooming of the Darwins. The Parrot tulips did not appear to be sufficiently hardy.

ANNUAL FLOWERS.

The list of annual flowers included sixty kinds, with a total of two hundred and five varieties. The object in view in the experiments with flowers is to determine the more hardy and satisfactory kinds and varieties for prairie conditions. The flower tests are conducted under conditions similar to those prevailing on the average farm. Artificial watering is not resorted to, nevertheless a magnificent showing of flowers was secured from seeds grown in the hotbed and transplanted in June. Also, in the case of the more hardy kinds, from seeds sown in the open.

The following is a list of flowers that were started in the hotbed early in April, and transplanted to the flower beds during the second week in June:—

Flowers Started in the Hotbed.

Kinds.	Height.	Flowering Season.	Remarks.
Flowers Started in the Hotbed.	Inches.		
Acroclinium	13	July 14 to frost	Everlasting flower.
Amoranthus tricolor	11		Foliage plant.
Antirrhinum, (Snapdragon) (11 varieties)	8 to 20	" 29, "	Tall growing varieties satisfactory.
Arctotis grandis	23	Aug. 14, "	
Aster, (29 varieties)	4 to 21	" 10, "	Ostrich plume, and Victoria types best.
Browallia elata, blue	13	" 10, Sept. 4	Flowers insignificant.
Carnation, pink	19	" 10, to frost	Too late for this district.
Clarkia elegans	26	July 12, Sept. 15	Very satisfactory.
Cosmea, (Cosmos)	31	" 12, to frost	Splendid for background.
Dimorphotheca aurantiaca	12	" 12, "	Many coloured, daisylike flowers.
Godetia	12 to 20	" 24, "	Very satisfactory.
Helichrysum	27	" 24, "	Everlasting flower.
Marigold	19 to 23	" 12, "	Add a touch of colour to back ground.
Nemesia, (6 varieties)	8 to 12	" 12, Sept. 15	Splendid, especially in moist soils.
Nicotiana, (Hybrid)	30	" 20, to frost	Sweet scented.
Pansy, (6 varieties)	6	" 12, to ey. Sept.	
Petunia	15	" 15, " "	
Phlox Drummondii, (7 varieties)	9 to 15	" 15, to frost	Good for cut flowers.
Schizanthus, large-flowered, Hybrids	20	" 19, Sept. 10	Very satisfactory.
Stock, (7 varieties)	14 to 18	" 10, to frost	
Swan River Daisy	12	" 11,	Beautiful, blue, free-flowering plant.
Zinnia	13 to 16	Aug. 2, to frost (Aug. 23)	Very susceptible to frost.
Flowers Started in the Open.			
Alyssum	6	July 17, to frost	Splendid border plant.
Bartonia aurea	29	" 28, to frost	Flowers yellow, numerous.
Candytuft	12 to 14	" 29, to frost	Can secure both white and carmine.
Cornflower	36	Aug. 1, to frost	Vigorous growing.
Castor-Oil Plant	26		Splendid foliage plant.
Centranthus macrosiphon	22	" 8, to frost	
Jacobaea	18	" 31, to frost	
Leptosiphon hybridus	7	July 4, Sept. 5	Beautiful border plant.
Linum grandiflorum rubrum	13	" 29, Sept. 11	Scarlet flax.
Lupinus	20 to 38	Aug. 2, to frost	
Mignonette	17	" 2	An old favourite.
Nasturtium, (9 varieties)	13 to 20	" 4, to frost	Tall variety best.
Portulaca, double	5	" 7	Spreading habit.
Poppy, annual	36	" 7, to frost	
Viscaria cardinalis	19	July 19, to frost	Very satisfactory.

EXPERIMENTAL STATION, LETHBRIDGE, ALTA.

REPORT OF THE SUPERINTENDENT, W. H. FAIRFIELD, M.S.

CHARACTER OF SEASON.

The year 1915 proved to be an exceptional one for small and tree fruits, vegetables, and flowers. The weather during the fall of 1914 was favourable to the ripening up of all tree growth so that bushes and trees of all kinds went into the winter in excellent condition. During the late summer and fall more than the normal amount of rain and snow fell so that the soil was thoroughly wet. The winter of 1914-15 was exceptional in character in that the dry winds usually so prevalent were entirely lacking. Instead of long periods during the winter with the land bare of snow there was continuous sleighing from the first week in December to the first week in March. The weather during April and May was normal with no sudden or severe cold dips and the result was profuse bloom on all fruit, flowering trees and shrubs. All the apple trees on the Station as well as in the district that were old enough to bear had fruit. During the summer there was an ample rainfall so that taking everything into consideration the season from a horticultural standpoint was extremely satisfactory.

The last frost in the spring was on May 16 when 30° Fahr. was registered, although there were very cool nights on June 14 and 15 when the mercury dropped to 36° as well as on June 28 when 37° was recorded. No damage, however, could be noticed even on the most tender foliage. The first frost in the fall came on the night of September 11, when 31° was registered and a killing frost the two succeeding nights, when 26° and 20° were respectively registered.

Table giving date of last frost in the spring and first frost in the fall during the last eight years, from the meteorological records of the Lethbridge Station.

Year.	Last frost.		First frost.		First killing frost.	
	Date.	Temperature.	Date.	Temperature.	Date.	Temperature.
		°		°		°
1908	May 2	32·0	Sept. 23	32·0	Sept. 26	19·2
1909	May 29	29·8	Aug. 28	29·8	Sept. 14	26·8
1910	June 4	31·0	Aug. 23	31·5	Sept. 12	26·3
1911	May 28	29·6	Aug. 27	29·4	Sept. 23	26·3
1912	June 3	32·0	Sept. 15	24·0	Sept. 15	24·0
1913	May 12	29·2	Sept. 12	32·0	Sept. 24	26·2
1914	May 12	29·8	Sept. 15	31·0	Oct. 7	20·1
1915	May 15	31·0	Sept. 11	31·2	Sept. 12	26·5

Average date of last frost in spring May 21.
Average date of first frost in fall September 8.

NO IRRIGATION.

Owing to the generous rains during May, June, and July no irrigation was required. Consequently in reporting the results from the two farms—irrigated and dry—no separation will be made as has been the custom in past reports.

POTATOES—TEST OF VARIETIES.

On the dry land, twenty-five varieties were planted May 20 on summer-fallow. Barnyard manure was applied in 1914 before the land was ploughed for the fallow. The rows were 30 inches apart and the sets were placed 12 to 14 inches apart in the row. They were dug October 18.

The same varieties were planted on the irrigated part of the farm on land broken and backset from brome grass sod in 1914. No irrigation was applied. They were planted in the same manner on May 13, and dug October 16. The yield was computed in each case from one-hundredth of an acre plot. Spraying was necessary on three occasions to subdue the ravages of the Colorado beetle which appeared in great numbers.

POTATOES.

No.	Variety.	On dry farm.				On irrigated farm.			
		Total yield per acre.		Yield per acre marketable.		Total yield per acre.		Yield per acre marketable.	
		Bush.	lb.	Bush.	lb.	Bush.	lb.	Bush.	lb.
1	Morgan Seedling	335	00	300	00	545	00	506	40
2	Empire State	293	20	265	00	513	20	466	40
3	Reeves Rose	288	20	248	20	610	00	568	20
4	Irish Cobbler	283	20	256	40	446	40	405	00
5	New Queen	278	20	246	40	540	00	493	20
6	American Wonder	276	40	256	40	429	10	406	40
7	Rochester Rose	268	20	240	00	490	00	448	20
8	Early Ohio	263	20	233	20	418	20	380	00
9	Houlton Rose	256	40	211	40	450	50	427	30
10	Vick Extra Early	255	00	223	20	551	40	530	00
11	Table Talk	251	40	203	20	471	40	430	00
12	Late Puritan	243	20	218	20	463	20	441	40
13	Factor	235	00	203	20	428	20	401	40
14	Dalmeny Beauty	233	20	171	40	438	20	388	20
15	Early Norther	228	20	206	40	528	20	498	20
16	Gold Coin	221	40	205	00	350	00	338	20
17	Money Maker	210	00	170	00	401	40	383	20
18	Early Hebron (White)	196	40	163	20	295	50	255	00
19	Dreer Standard	190	00	171	40	380	00	358	10
20	Wee MacGregor	173	20	140	00	471	40	430	00
21	Everett	168	20	116	40	395	00	355	00
22	Hard to Beat	165	00	125	00	455	00	411	40
23	Rawlings Kidney (Ashleaf Kidney)	158	20	141	40	445	50	413	20
24	Green Mountain	146	40	125	00	285	00	255	00
25	Carman No. 1	126	40	106	40	350	00	300	00

In the table it will be noted that the Gold Coin was rather low. This is rather unusual and hard to explain for during the last eight years, of all the varieties tested, it has averaged high (this includes the results of 1915) heading the list on the dry land and almost at the top on the irrigated land. We therefore recommend from the 8 years' tests the following varieties for main croppers:—Gold Coin, Morgan Seedling, Wee MacGregor, Table Talk, and Empire State, but personally prefer the first-named. Careful observations were taken by digging a few hills each week during the season of each variety to gather data regarding the earliness of the different sorts under test. Out of the 25 varieties tested the following stand out for earliness:—Irish Cobbler, Vick Extra Early, Rochester Rose, and Reeves Rose.

LETHBRIDGE.

To obtain potatoes for the table early in the season it may be of interest to those who have not tried it out to take any of the early varieties and from the first to the second week in March, spread out as many as convenient in the light, opposite a window if possible, and allow them to sprout. Whole potatoes, not too large, should be used for this purpose, care being taken to put them seed end up. Sprouting will gradually commence and by the last week in April these can be planted, the sprouts by this time being from half an inch to one inch in length, thick and green in colour, very different to the slender white sprouts that ordinarily come on the potatoes in the bin.

THE VEGETABLE GARDEN.

Owing to the good fall of snow which did not melt until spring the soil was in prime condition for sowing seeds. The garden was manured and ploughed in the fall and in the spring a portion was again ploughed, the remainder being double disced. The latter proved to be the better method as an even germination was obtained whereas with the former an uneven germination resulted.

Beets.—All varieties as in previous years did well, seven varieties being tested. Four of these can be recommended for table use, namely: Black Red Ball, Crosby Egyptian, Early Model, and New Meteor, the first named being the best, although small compared with other varieties and yielding only about half as well, but when cut the flesh is a rich dark red throughout while the larger varieties being streaked with white are less attractive for table use.

Beans.—Eight varieties were under test, all yielding a heavy crop of pods. Owing to the early frost no seed ripened this year. Varieties recommended are as follows: Bountiful, Fordhook Favourite, Wardwell Kidney Wax for earliness, and for late varieties Refugee or One Thousand to One.

Celery.—All varieties made good growth before being taken inside, eight varieties being under test. Among the best is White Plume, an exceptionally good variety which yielded 48 pounds from a 15-foot row, the plants being 6 inches apart. Other good varieties are Golden Self Blanching, French Success, Evans Triumph, and Noll Magnificent. The seedlings were all started in a hotbed.

In connection with the growing of celery a number of cultural experiments were carried out. To determine the best method to use in blanching, tests, with boards, soft pliable material, and earth, were made. The test with the boards gave best results. A row 30 feet long was planted. When the plants were about one foot high, a board 12 inches wide was placed on each side of the row as close as possible to keep out the light. This proved very satisfactory as the plants were of good size, solid and very tender. The 30-foot row yielded 55 pounds. This method greatly reduces the cost of production.

Another row of celery of the same length and at the same period of growth was treated in a similar manner with pliable material put on each side of the row and held into place by pegs. The plants in this case were very weakly when dug, the outside stalks having withered, leaving but few stalks in the centre. The row yielded 37 pounds.

The experiment with earth which was applied around the plants as necessary proved to be the most costly method and the celery took longer to bleach by this method than with the boards. The total yield was 72 pounds, being the heaviest yielder of the three methods.

Cabbage.—The cabbage gave splendid results this year, eight varieties being under test, Early Paris Market and Copenhagen Market being the earliest. Twelve average heads of the latter weighed 135 pounds. For a good main crop, Improved Amager

Danish Roundhead, Fottler Improved Short Stem, Nofalt, and Flat Swedish can be recommended. Of the latter 12 average heads weighed 182 pounds. Cabbage should be started in the spring in a mild hotbed.

Cauliflower.—Early Snowball, Danish Giant, and Improved Early Dwarf Erfurt were under test. These are all good varieties, 12 average heads of Early Snowball weighed 75 pounds. Danish Giant was later, but 12 average heads weighed 105 pounds. In planting cauliflower, if two later plantings are made, the Danish Giant is preferred for this purpose, and a continuous supply can be had till severe frosts come. All the cauliflower were started in a hotbed.

Cucumber.—This was an exceptional year for cucumbers, all varieties giving good yields and were in full bearing when killed by frost. Seven varieties were under test. Three plants of each variety were started in pots in the hotbed, but were soon moved into a cold frame. Cold damp weather followed, which spoiled the majority of the plants. The remaining plants were planted out in the garden on June 15, while the seeds were sown in the open on June 1. The plants started in the frame proved to be the earlier by a week and gave the heavier crop in each case. Among those recommended are Davis Perfect, Peerless Improved or White Spine, and Cool and Crisp.

Corn.—This was an ideal year for corn but owing to inferior seed the germination in many cases, was poor. Eleven varieties were under test. The Squaw, sown on April 17, was the earliest maturing variety, the first being ready for use on July 27. The Early Malcolm, Early Iowa, and Early Fordhook, being the earliest of the sweet corn varieties, were planted on May 6, and were ready for use on August 18. The best of the later varieties are Golden Bantam and Pocahontas.

Carrots.—Chantenay Half Long and Early Scarlet Horn were under test, both proving satisfactory.

A cultural experiment was carried out with carrots planted at different distances apart, the Chantenay variety being used. Three rows 33⅓ feet long were thinned to 1½, 2, and 3 inches apart respectively. The wider planting gave the best returns, the 1½-inch planting yielding 70 pounds, the 2-inch, 96 pounds, and the 3-inch 106 pounds per row.

Leeks.—French Carentan and English Glory were under test. The seeds were sown in a hotbed and planted out in rows 6 inches apart. The plants made good growth.

Lettuce.—All varieties did very well, forming good heads. Of the 6 varieties tested the Iceberg and Dreer Allheart were the earliest being sown on April 14 and ready for use on June 14, lasting until August 11. Grand Rapids was the best variety for forcing under test and for a good cabbage heart lettuce the first mentioned can be recommended.

Melons.—Two varieties of water melons and two varieties of musk melons were tried out. Although a large number of fruits developed, none reached maturity.

Onion.—All the varieties under test did exceptionally well and matured before frost came. Thirty varieties were sown in rows 30 feet long. The White Queen, White Barletta, and White Pearl were the first to ripen. To ensure a crop of onions reaching maturity before frost it is advisable to include white onions when sowing. If small white onions are required for pickling, sow any of the above mentioned varieties very thickly and do not thin. Among the varieties recommended are Yellow Globe, Red Globe, Large Red Wethersfield, Early Red Flat, and New Australian Brown. These varieties yielded from 32 to 38 pounds from a 30-foot row this season.

LETHBRIDGE.

Cultural experiments.—The seed was sown in the garden April 20, and the following yields were obtained from a row 33·3 feet long in each case. In the last column of the table is given the yields obtained from plants started in a hotbed and transplanted into the garden on June 5, 3 inches apart.

——	Thinned to 1 inch apart.	Thinned to 2 inchesapart.	Thinned to inches apart	Transplanted from hotbed.
	lb.	lb.	lb.	lb.
Yellow Globe	64	68	46	50
Large Red Wethersfield	51	50	40	68
Extra Early Red	37	36	32	49

Starting the seed in a hotbed and transplanting is a more expensive way but the onions produced were more uniform in size. Another advantage of this method is that the crop is more certain, for, in a dry season, the seed sown in the open may not germinate well. We are not prepared to recommend the practice, for the advantages obtained will scarcely compensate for the additional trouble and labour required. If onion seed is sown in the spring as soon as the land is freed enough of frost to be worked, any one of the above varieties will give fairly satisfactory results in a favourable season. Our seasons, however, are short and difficulty in getting the onions to mature by fall is often experienced.

Onion sets were planted 2 inches deep and 3 inches apart in a row 33⅓ feet long and produced 84 pounds. This method of growing onions is the safest, as one can always be sure of obtaining a well ripened crop. The sets may be raised at home by sowing the seeds very thickly in rows so as to keep the plants crowded and limited in size. In the late summer they should be pulled and dried out and then stored for the winter in a dry place where they will not be subjected to severe freezing. A row each 100 feet long of Yellow Globe and Extra Early Red onion seed was sown for sets and produced 218 and 226 pounds respectively.

Parsley.—Double Curled was the only variety tested, and made splendid growth, the leaves being large and well curled.

Parsnips.—Parsnips as usual did very well but should always be sown where some of them can be left in the ground all winter as they get very soft when out of the ground a short time unless covered with sand in the cellar. Thinning experiments were carried out. Three rows were thinned out to 2, 3, and 4 inches respectively. The 3-inch test yielded the heaviest, giving 100 pounds from a 33⅓-foot row.

SEED PRODUCTION.

It is probably easier to raise seed of the parsnip than any other of the garden roots. When left in the ground they keep perfectly till spring when they at once start a seed stalk if left undisturbed, and usually produce an abundant crop of seed. A 250-foot row of Hollow Crown planted in 1914 was left for seed and yielded 180 pounds of seed, although it is estimated that one-sixth of the crop was lost by shattering out owing to the fact that the stalks were allowed to get too ripe before cutting.

Peas.—Seventeen varieties were under test. The Thomas Laxton and Gradus were the earliest, being sown with the other varieties on April 17 and ready for use

on July 3. The Early Giant, Quite Content, and Telephone were the best varieties for a main crop. Owing to a severe attack of mildew a number of the later varieties did not do so well.

Experiments were carried out with four sowings of Thomas Laxton peas, each sowing seven days apart. The following are the yields of green peas from a 50-foot row in each case. The peas were sown 1 inch apart in the row.

1st sowing April 20	45 pounds.
2nd sowing April 27	58 "
3rd sowing May 4	51 "
4th sowing May 11	35 "

Pumpkins.—The Jumbo, Large Field, and Sweet As Sugar, were the varieties tested. All varieties developed well, but only a few of the fruits matured. Three plants of each variety were started in a hotbed in pots, being planted out in the garden on June 15, and three hills of each variety were sown in the open on May 31. Those started in the hotbed were first in ripening. The following yields will give the comparison: Jumbo, plants started in a hotbed, 243 pounds, 131 pounds ripening; from seed sown in the open, 256 pounds, 74 pounds ripening; Large field, plants started in hotbed, 260 pounds, 107 pounds ripening; from seed sown in open 269 pounds, 58 pounds ripening; Sweet as Sugar, plants started in hotbed 118 pounds, 78 pounds ripening; from seed sown in open 115 pounds, 18 pounds ripening. It may be worthy of note that Sweet as Sugar, although not so large as the other varieties, are good keepers.

Radish.—Scarlet Turnip White Tipped, and Forcing Turnip Scarlet were the varieties under test. Both produced a good crop. Seed sown on April 16 were ready for use May 22. The seed should be sown rather thickly so as to keep the roots small and ensure a continuous supply. If sown thin they are usually all ready at the same time, getting too large before they can be used.

Squash.—Eight varieties were under test. Three plants of each variety were started in pots in the hotbed, being reported when large enough and hardened off in cold frames. Those started in the hotbed were the first to be ready for use. Among the best varieties are Golden Hubbard, Delicious, Long White or Vegetable Marrow, and English Marrow. The following are the results obtained from the plants started in pots in the hotbed compared to those sown in the open.

Golden Hubbard—Started in hotbed	114	pounds,	86	pounds	ripening.
Sown in open	87	"	63	"	"
Delicious—Started in hotbed	100	"	63	"	"
Sown in open	62	"	28	"	"
Long White—Started in hotbed	207	"	134	"	"
Sown in open	192	"	75	"	"
English Vegetable Marrow—Started in hotbed	278	"	168	"	"
Sown in open	128	"	72	"	"

Tomatoes.—None of the eight varieties under test ripened many tomatoes owing to the cool wet summer. The plants were started in a hotbed and transplanted into 2½-inch pots and again into 4½-inch and finally into 6-inch pots. On May 15 they were turned out of the pots and planted, care being taken not to disturb the roots. This method ensured the plant having no check in its growth and giving it a good start. Five plants of each variety were set out. The following varieties can be recommended for earliness and yield:—

Northern Adirondack Earliana	2	pounds	ripened,	54	pounds green.
Alacrity	3¼	"	"	39	" "
Earliana (Sunnybrook strain)	1⅜	"	"	37	" "
Bonny Best	½	"	"	32	" "
Rennies XXX (early round scarlet skin)	1	"	"	32	" "

LETHBRIDGE.

Continual pinching out of the side shoots is necessary to get the fruit to develop as quickly as possible. When the shoots are large select 1 to 4 of the shoots, pinching the others out, the remainder can either be tied to sticks or left on the ground; cleaner tomatoes being the only advantage in the former method. All side shoots must be pinched out of each stem left. After the fourth or fifth flower appears the point or crown should be pinched out above the first leaf after the flower, this gives all the fruit a chance to develop. It is needless to note that the less fruit allowed to grow on a plant the better are the chances of ripening.

Spinach.—Spinach is one of the first vegetables ready for use. The leaves are cut while young and boiled for table use as one would prepare cabbage. The Victoria was the only variety under test. The seed can be sown in the fall as it is quite hardy.

Salsify or Vegetable Oyster.—Long White was the only variety used. It made good growth.

FLOWERS.

ANNUALS.

Owing to the short season and the tenderness of a number of varieties of annuals, it has been found necessary to start the plants in hotbeds. A circular describing the method of preparing a hotbed can be had on application. If a hotbed is not available the seeds may be sown in a window box. As soon as the second set of leaves appears the plant should be transplanted into another shallow box about 2 inches apart and where they may remain until about the 1st of June, when danger of frost is past, and they can be set out in the open. It is not wise to attempt to grow them in a box without transplanting them into another box as just described for unless transplanted they are inclined to grow too spindly and tall.

This was an exceptionally good season for annuals as there were frequent showers at the time of planting out and during the season. There were approximately 12,000 plants set out, which included fifty varieties of annuals. Seventy varieties of sweet peas were sown as early as possible in the spring and made a splendid showing.

Owing to the character of the season very few varieties ripened seed. The following kinds can be numbered among the easiest to raise: Antirrhinum (or snapdragon), larkspur, phlox, verbena, pansy, helichrysum (everlasting), zinnia, petunia, marigold, nicotiana, lavatera, coreopsis, and lobelia. All of the above can be obtained in various colours. The following are perfectly hardy and grow best sown in the open: Nasturtium, mignonette, poppy, calendula and candytuft.

Bulbs.—The first thing necessary when planting bulbs is to have the ground in readiness, it being prepared during the summer by applying a heavy coating of well rotted manure and digging a foot deep, care being taken to keep the manure well down. At the beginning of October the bulbs should be planted 4 inches apart, either in rows or massed. Root development commences early in October under natural conditions and continues throughout the winter. If the bulbs are planted later than the end of October there is less chance of getting good blooms owing to the lack of root development in the fall. Tulips, and daffodils, especially the former, do extremely well. Thirty-two varieties of tulips and fourteen varieties of daffodils were received from Holland and planted in the borders of the lawns in October of 1914. From about the last week in April to the end of May the border was a mass of colour. The early tulips came out followed by the late-flowering varieties, and last of all came the Darwin tulips. The varieties recommended are: Early tulips—Vermilion Brilliant (bright vermilion), Proserpine (crimson pink), La Reine (white), Joost Van Vondel (white), Artus (scarlet), Chrysolora (yellow), and Cottage Maid (pink). Late flowering—

Isabella (rosy pink), La Candeur (white), La Merveille (orange red). Gesneriana Spathulata (bright scarlet). Darwin Tulips—Clara Butt (apple blossom), Europe (carmine red), Farncombe Sanders (scarlet), Pride of Haarlem (carmine pink), Madam Krelage (bright pink light edge).

Daffodils.—Princeps, Golden Spur, Van Sion, Emperor, Empress, Poeticus (white), Poeticus Glory (white), and Victoria.

HERBACEOUS PERENNIALS.

In planting perennials it must be borne in mind that the plants are to stay in the ground for several years. This means that they will require very rich soil to maintain their standard of perfection. The ground should be prepared the year before, being heavily manured and dug or ploughed as deeply as possible. A good collection of varieties has now been established on the Station from seed sown in 1912, most of the plants having made strong and healthy growth. A well-selected collection of perennials is perhaps the easiest and cheapest way to have a continuous supply of flowers. The following kinds can be recommended: Paeonies, irises, delphiniums, aquilegias, coreopsis, gypsophila, phalaris, acouitum, spiraea, papaver, polemonium, veronica, thalictrum, dianthus, lupinus, campanulas, hollyhocks, trollius, rudbeckia, and phlox. All of the above varieties can be had in variety.

ROSES.

There are now twenty-five varieties of roses grown at the Station. Of these, fifteen are Hybrid Perpetuals and ten Hybrid Teas which are the first to bloom and continue to bloom until spoiled by frost in the fall. Very little attention is required in growing roses after the plants have become established, although they are often attacked by aphis during the summer. For this trouble, spraying continuously with water is a good preventive when the plants are slightly attacked. When severely attacked kerosene emulsion may be used but care should be taken to see that it is not too strong when applied. In the fall the plants should be cut back to about 9 or 12 inches when the growth is not very vigorous, or a few inches longer if the plant has made strong growth. They should be tied together with a piece of twine and covered with moist soil. In the spring this covering may be removed when the buds begin to swell.

Among the varieties to be recommended are the following: Hybrid Perpetuals; Frau Karl Druschki (white), Magna Charta (pink), Ulrich Brunner (red cerise), Baroness Rothschild (light rose, shaded white), Mrs. R. G. Sharman Crawford (rosy pink), Charles Lefebvre (velvet shaded crimson), Paul Neyron (dark rose), Hugh Dickson (crimson), Mrs. J. Laing (soft pink), and Senateur Vaisse (salmon).

Hybrid teas: Le Progres (nankin yellow), Madame Ravary (golden yellow), Gruss an Teplitz (semi-double crimson), Caroline Testout (salmon pink), Etoile de France (velvety crimson), Ecarlate (brilliant scarlet), Lady Ashtown (rose, shaded to yellow), and Killarney (flesh, shaded white suffused with pink).

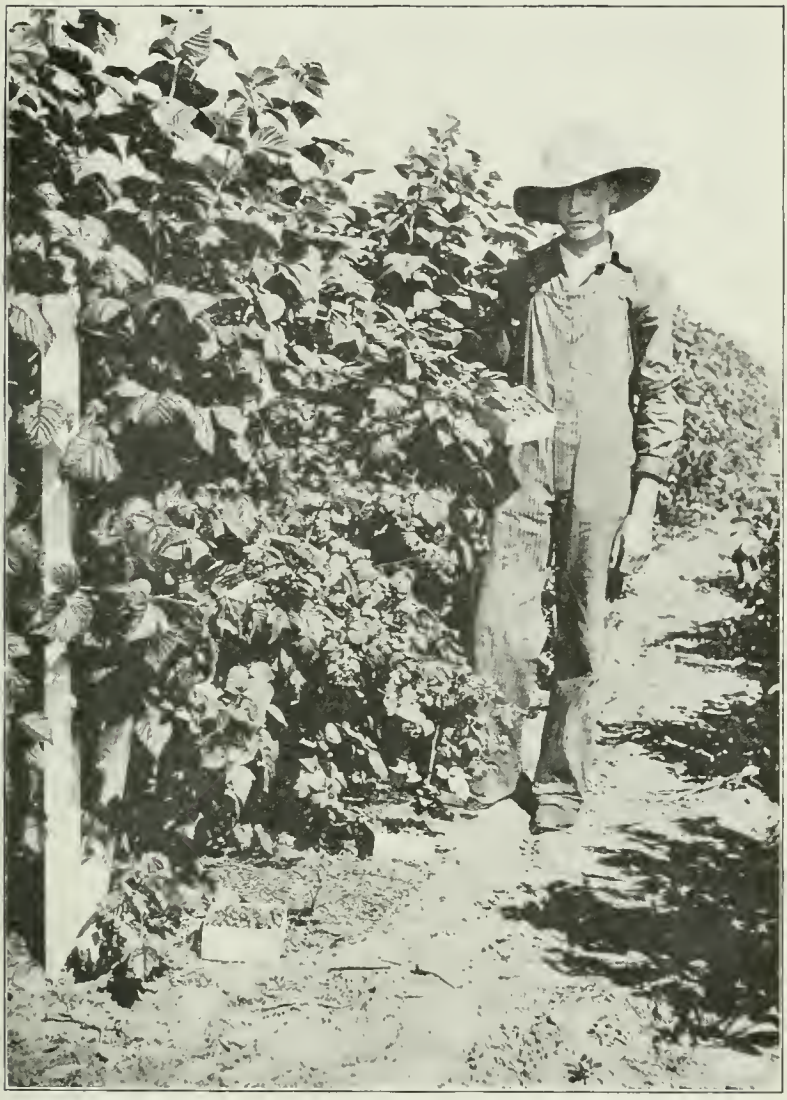
ORNAMENTAL SHRUBS.

Fifty kinds of shrubs are being tried out for hardiness. There are 170 varieties in all. A number of kinds have died out entirely, others are only half hardy, while quite a number have proved to be quite hardy and well suited to our conditions. A large number flowered very freely this year, making a splendid show. Among those to

Raspberries being prepared for winter. In the foreground are the branches bent over and held by clods of earth and in the background they are covered with straw held down by poles. Rosthern Experimental Station.

The Superintendent's residence. Experimental Station, Lethbridge, Alta.

A Yellow Transparent apple tree with some of the fruit. Experimental Station, Lethbridge, Alta.



Cuthbert Raspberries. Experimental Station, Lacombe, Alta., 1915.

Agassiz, B.C. A type of early blooming tree. Japanese Flowering Cherry.

be recommended are: Lilacs—Charles X, Charles Joly, Souvenir de Ludwig Spaeth, Jacques Calot, Madame Fernande Viger, Congo and Boussingault. All blooming from the middle of May on till about the middle of June. These are followed by *Syringa villosa*, a lilac which flowers when the others are past their best. *Lonicera tatarica grandiflora, L. alpina, L. grata,* and *L. Albertii,* blooming toward the end of May. Philadelphus, Manteau D'Hermine, and Fantaisie, blooming about the middle of June. *Cytisus triflorus* and *C. hirsutus* flowering towards the end of June. *Spiraea multiflora arguta* blooming at the end of April. *S. Menziesii triumphans* blooming about the first week in July. *Caragana grandiflora, C. arborescens, C. frutescens* and *C. pygmaea,* blooming from the middle of May.

Experiments are being carried on with shrubs for hedges, 20 varieties being used. Most of these are answering the purpose very well. For a hedge from 3 to 6 feet high the following can be recommended: *Caragana arborescens* (Siberian pea tree), probably the most satisfactory of all, *Crataegus Crus-Galli* (Cockspur hawthorn), *Syringa Josikaea* (Josika's lilac), *Rhamnus Frangula* (Alder buckthorn), *L. cathartica, Cotoneaster sinensis,* and *Acer tatarica Ginnala.* When taller hedges are required, Native cottonwood, Manitoba maple, *Elacagnus angustifolia* (Russian olive), and Green Ash are suitable. For rapid growing windbreaks, the Native cottonwood, Sharp-leaved and Laurel-leaved willows are good, also the Golden willow, although it is not quite so hardy as the other two.

The spruce and pine trees did very well this season making very good growth, some of the trees making as much as 2 feet.

SMALL FRUITS

CURRANTS.

Owing to the mild weather in April the sap commenced to flow earlier than usual, the currant bushes being in full bloom two weeks in advance of the usual time, but no bad results followed.

A few hints on pruning may be of interest to those who are not acquainted with this necessary item of culture. Red and white currants are pruned by removing all cross wood and weakly branches and most of the young growth or suckers growing around the base of the bush. After this has been done the young shoots on the remaining branches may be cut back to two buds but leaving the leading shoot about 6 inches long. The fruit is borne on old wood. Black currants on the other hand bear their fruit on young wood. This makes it necessary to leave plenty of young wood and only cutting out the old wood of little value and suckers around the base of the bush, although some strong shoots should be left to replace the old branches when necessary.

Black currants.—Three bushes each of 17 different varieties were under test, all giving excellent results, the yield being noticeably increased this year. The following are the varieties considered best:—

	Yield from 3 bushes.	Yield per acre.
Eagle	38 qts. 1 pt.	15,515 qts. 1 pt.
Saunders	37 " 1 "	15,112 " 1 "
Merveille de la Gironde	34 " 1 "	13,903 " 1 "
Ontario	32 " 1 "	13,097 " 1 "

Red currants.—Three bushes each of 19 varieties were under test, all giving good results this season. The following are among the best varieties:—

	Yield from 3 bushes.	Yield per acre.
New Red Dutch	46 qts.	18,538 qts.
Cumberland	38 "	15,314 "
Red Dutch	34 "	13,702 "
Victoria Red	29 "	11,687 "

White currants.—Three bushes each of 9 varieties were under test, the best of which are the following:—

	Yield from 3 bushes.	Yield per acre.
White Pearl	37 qts.	14,911 qts.
Large White	26 " 1 pt.	10,679 "
White Grape	25 " 1 "	10,276 "

GOOSEBERRIES.

The difficulty found in the raising of gooseberries is the killing back of the wood in severe winters, but in this regard one variety known as the Houghton has been found to be perfectly hardy. This variety is a very rapid grower, producing an abundant crop of fruit every year. Although the fruit is small compared to that of other varieties they are excellent for general purposes. Care must be taken to keep the bushes under control as they are very apt to spread badly.

This is the first season the gooseberries under test have produced a satisfactory crop of fruit. Care should be taken while the bushes are young to keep all the suckers growing around the base dug out, as cutting them off at the ground does not kill them and they will come on the following season. Pruning can be done in the fall or in the spring before the buds start to swell. The method recommended with red and white currants can be practised.

The varieties of gooseberries which did well for us this season are: Whitesmith, Smith Improved, and Downing.

RASPBERRIES.

Nine varieties were under test, each variety being planted in a double row 30 feet long. Owing to the canes killing back during the winter if left unprotected, it is necessary to bend the canes down and cover completely over with moist soil. Straw or other material has been found to be of no use for this purpose. Preparatory to covering the canes up in the fall all the dead and weakly canes should be cut out. A small quantity of soil should be placed at the base of the canes to reduce the risk of breaking them when turning them down.

The following is the yield obtained from the varieties recommended:—

	Actual yield.	Yield per acre.
Loudon	35 qts. 1 pt.	3,692 qts.
Ruby	30 " ½ "	3,146 "
Marlboro	29 "	3,061 "
Herbert	17 "	1,768 "

STRAWBERRIES.

Strawberries are perhaps the easiest to raise and the most satisfactory of the small fruits. The best results are obtained by setting the plants out in the spring in well prepared rich soil. They may be put out in August, but owing to the short period of growth between then and frost, the results obtained are not so satisfactory as when spring planting is done. Plenty of cultivation should be given at all times and no weeds should be allowed to grow. In the late fall or early winter the land should be covered a few inches deep with old straw or hay, preferably material free from all kinds of seeds. It is not wise to use manure for this purpose.

LETHBRIDGE.

The yield of fruit in 1915 was greater than we have ever obtained. The following table gives the results obtained for the last five years:—

STRAWBERRIES (Irrigated)—Yield per Acre.

No.	Variety.	1911.	1912.	1913.	1914.	1915.	Average yield for 5 years.
		Qts.	Qts.	Qts.	Qts.	Qts.	Qts.
1	Senator Dunlap	139	2,201	2,559	934	4,565	2,080
2	August Luther	325	372	3,569	1,193	3,890	1,870
3	Splendid	294	43	1,556	389	6,017	1,660
4	Ruby	511	77	2,179	467	3,864	1,420
5	Pocomoke	124	15	2,109	1,141	3,423	1,362
6	Williams	170	0	1,660	1,141	3,631	1,320
7	Bismarck	217	124	1,867	1,297	2,905	1,282
8	Tennessee Prolific	186	156	1,314	1,192	3,320	1,234
9	Sample	279	62	1,141	648	3,994	1,225
10	Fountain	201	434	1,452	415	3,112	1,123
11	Clyde	93	46	1,141	467	3,631	1,076
12	Glen Mary	155	139	1,245	985	2,697	1,044
13	Marie		15	1,245	519	3,216	999
14	Abington	263	248	906	233	3,216	973
15	Ridgeway	418	93	985	363	2,905	953
16	Aroma	108	62	1,407	363	2,697	927
17	Minute Man	123	135	553	858	2,516	837
18	3 Ws	155	0	429	311	3,112	801
19	Beder Wood	217	15	778	155	2,749	783
20	Chapman	139	0	622	337	2,749	769
21	Wm. Belt	170	0	1,349	33	2,282	767
22	Gandy	46	0	629	674	2,282	726
23	Van Deman	15	0	830	259	2,282	677
24	Nellie P	31	0	560	694	1,867	630
25	Brandywine	310	124	387	285	1,167	455
26	Uncle Jim	186	139	129	129	1,037	324
27	Buster	232	15	248	78	882	291
	Average yield of all varieties	189	167	1,217	576	2,963	.....

TREE FRUITS.

APPLES.

The apple crop was a great success this season. The larger apples gave good results, several varieties fruiting for the first time. The crabs and cross-bred apples gave particularly satisfactory yields. In the new dry land orchard started this season over 2,000 seedlings of different varieties of apples from 2 to 4 years old were set out. A small orchard of named varieties was set out also. The following are varieties which fruited and the highest yield from one tree of the variety named:—

	Lb.
Large apples—	
Charlamoff	14
Yellow Transparent	60
Milwaukee	57
Dudley	6
Navan	4
Patten Greening	70
Minnesota Hybrid	4
Wealthy	½
Hibernal	5
Excelsior	48
Okabena	14
Winter Rose	7
Duchess	43
Rupert	3
Longfield	2
Simbirsk	2
Roslin	4
Cross-bred apples—	
Bow	61
Norman	144
Pioneer	121
Mecca	149
Silvia	150
Magnus	245
Jewel	155
Robin	162
Prince	81
Tony	160
Crab apples—	
Cottage	38
Transcendent	40
Florence	140
Dartt	6

PLUMS.

A number of selected Manitoba plum seedlings were planted out in 1912 and several bore fruit this year for the first time.

EXPERIMENTAL STATION, LACOMBE, ALTA.

G. H. HUTTON, B.S.A., SUPERINTENDENT.

The season of 1915 proved one of the most satisfactory years possible from the viewpoint of the horticulturist. When growth of trees and shrubs started in the spring, no winter injury was shown, and as the minimum temperature recorded was only—25·1 F., it is scarcely necessary to state that all trees and shrubs came through in good condition.

Cultivation of the land began on April 5, with the soil in good condition for work. The latest spring frost occurred on May 22, and the period from then to September 13, when the first frost of the fall was recorded was seasonable both as to precipitation and temperature.

The lawns of Kentucky blue grass made a splendid showing as there was continuous new growth due to the liberal rainfall. Trees and shrubs made satisfactory progress and ripened their wood fairly well prior to the killing fall frosts. The hedges planted during the past three years are now making a creditable showing and create a keen interest on the part of visitors. The flower border produced a luxuriant growth of foliage and bloom and was much admired during the entire growing season, the tulips being particularly attractive.

ORCHARD.

The fact that for three years in succession crab-apples have been produced here is evidence that it will be possible to produce standard apples when varieties of this class of fruit are produced which are equally suitable to the vagaries of this climate as are the cross-breds and some of the crab-apples. The argument is repeatedly advanced by those who consider that apples will never be grown in this section of the West that the late spring frosts will almost invariably kill the apple blossom and that for this reason alone we cannot expect to produce standard apples here. The answer to this argument is conclusive and it is only necessary to refer to the records of the past three years, which show the production of crab-apples, to effectively minimize the force of this argument. The following varieties of cross-bred apples fruited during the past year: Charles, Prince, Pioneer, Eve, Robin, Jewel, Progress, Aurora, Alberta.

Though the fruit is small, the texture is fine and since there would appear to be a relatively large percentage of water in the fruit, it is admirably adapted to the production of high quality jelly.

The apple seedlings to the number of about 6,000 have made satisfactory growth during the past year. It is the intention to thin the least promising of these seedlings from the nursery row during the coming spring. This thinning will permit of the fruiting of the balance of these trees in the nursery row where the hardiness is being established and will permit of testing the quality of the fruit with the least possible labour. The varieties of apples from which these seedlings have been produced include the following: August, Anis, Anisim, Anis Rose, Antonovka, Baraboo, Blushed Calville, Bogdanoff, Charlamoff, Grandmother, Hibernal, Hoadley, Iowa, Beauty, Lowland Raspberry, Moscow Pear, Patten Duchess.

The growth of the wind-break to the north of the orchard is providing much needed protection and during the past season wind-breaks of laurel-leaved willow have been planted east and west across the orchard at intervals of about 150 feet. The rapid growth of the laurel-leaved willow will insure the development of a satisfactory wind-break at these rather close intervals within the next four years. The most promising sorts of standard apples and varieties which we expect will fruit under satisfactory conditions as to protection by wind-breaks are: Hibernal, Blushed Calville, Yellow Transparent, Charlamoff, Antonovka.

PLUMS AND CHERRIES.

We have again to report no success in the production of fruit of either plums or cherries. Even during the past comparatively mild winter, the plum trees native to Manitoba showed winter injury here. It is apparent that this injury does not result from low temperatures but is caused in our opinion by the rapid evaporation due to our relatively dry atmosphere for which the limited precipitation of the fall of the year does not provide.

SMALL FRUITS.

CURRANTS.

Currant bushes have been injured apparently by the attack of a fungous disease known as *Nectria cinnabarina*, Fr. It is claimed that the disease is saprophytic and not parasitic; that it develops after the death or injury of the bush due to other causes. From the fact that the disease may appear on a part of the bush only and that the other branches, which seem vigorous at the time the fungus first makes its appearance in the other parts of the bush, will quickly decline in vigour until the entire bush is affected, it would appear to warrant the conclusion that the disease, though it may attack weakened bushes, will hasten the destruction of the currant plantation by its establishment therein. We believe that maintaining the vigour of the plantation through fertilizers and proper pruning, the disease may be prevented from obtaining a foothold. All affected bushes should be removed.

The currant maggot (*Epochra canadensis*) has also made serious attacks on the red and black currants here during the past year. It would appear that there is no very practical method of controlling this pest since the only recommendation made for control is to remove the surface three inches of soil beneath the bushes and replace this with fresh earth. The soil which has been removed may either be buried deeply or the puparia contained in it may be destroyed by the use of a strong solution of Kreso Dip.

The plantation of currants set in 1914 made a good growth during the season and produced a fair yield of fruit of large size and good quality. The varieties of black currants in this plantation heading the list this year are: Ogden, Climax, Merveille de la Gironde, Kerry, Beauty.

Those varieties which lead taking the average of the previous four years are: Beauty, Merveille de la Gironde, Magnus, Lee Prolific.

LACOMBE.

RED CURRANTS.

The red currant bushes do not make as rapid growth as do those of the black varieties, therefore the yield of red currants in the new plantation this year does not compare favourably with that secured from the black varieties.

The following table shows the yield from three bushes of each variety for 1915 together with the yield since 1911 and the average for five years:—

Variety.	1911.		1912.		1913.		1914.		1915.		Average.	
	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.
Cumberland Red	1	3½	10	4	5	8	3	8	7	8	5	9½
Victoria	2	13	17	8	2	5	1	2	.....		6	3
Frauendorfer	3	10½	7	8	.....		.....		.....		5	9½
Red English		8½	4	0	5	0	5	13	.....		5	13
Red Dutch		10	10	4	17	8	14	6	7	14	12	00
Prince Albert	1	00½	24	12½	19	14	40	00	19	15	21	02
Rankins Red	1	3	6	9	14	6	23	15	10	13	11	6
Fay Prolific	6	5½	13	13	1	10		8	.....		5	9
Champagne Red	2	2	6	6	3	11	3	12	.....		3	15
La Conde	4	15½	11	10	9	00	9	2	7	15½	8	08½
Benwell	3	6½	11	7	12	14	7	10	.....		8	14
Wilder	.....		11	00	1	7	3	0	1	14	4	5½
Red Dutch (new)	1	0	13	15	19	5	13	3	3	3	12	2
Pomona	1	14½	7	8	14	2	3	12	13	8	8	2½
Long Bunch Holland		8	16	12	26	14	18	11	.....		15	10
Raby Castle		4	7	6	4	8	9	14	2	14	4	15½
Moore Seedling	4	12	1	6	4	0	15	6	14	7	7	15¾
Early Scarlet	7	7½	2	10	4	1	3	7	7	8	5	00¼
Red Grape	1	4½	4	1	6	14	8	15	6	14	5	9½
Large Red	2	7	10	15	10	00	1	3	.....		6	2
Wentworth Leviathan	.....		6	3	7	4	2	4	.....		5	4

WHITE CURRANTS.

The white currants are located in that part of the plantation most affected by the Currant Maggot and therefore the yield for 1915 is poor. The varieties White Pearl and Climax White gave the largest yield.

GOOSEBERRIES.

The most satisfactory crop of gooseberries yet produced was grown during the past season. Considering the size of the bushes the yield was large and the quality was everything that could be desired. The bushes were covered during the previous winter with earth, as past experience has shown that winter protection of any other kind such as strawy manure is not satisfactory. The labor in covering the bush completely with earth is not as great as one who has not undertaken this work might expect, and is not so serious as to prevent any lover of this class of fruit from growing them because of the necessity for this kind of winter protection. The following table shows the yield from three bushes of each variety during the past year and indicates the rate per acre:—

GOOSEBERRIES.—Five Bushes.

Variety.	1915.		Yield per acre.	
	lb.	oz.	lb.	oz.
Queen Anne	5	2	1,511	14
Smith Improved	3	10	1,130	1
Silvia	7	8	2,212	6
Richland	2	3	645	12
Carrie	5	0	1,476	00
Downing	1	8	451	00
Houghton	15	4	4,499	12

RASPBERRIES.

The raspberry plantation produced a fair crop of excellent fruit in 1915. The canes showed no injury from any cause. The fruit was large and the yield was such that any one interested in this line of work would be justified in undertaking the production of raspberries in a commercial way and expecting a very satisfactory return on the basis of the yields secured here this year.

The following table shows the yield from forty hills for 1915, that for 1914, and the average for the two years:—

Variety.	1914.		1915.		Average.	
	lb.	oz.	lb.	oz.	lb.	oz.
Loudon	21	8½	.....			
King	22	5½	15	11	19	0¼
Sarah	24	12	23	8	24	2
Shaffer (Colossal)	.....		3	12		
Herbert	1	11	32	00	16	13½
Golden Queen	8	7	4	7	6	7
Sunbeam	8	3	15	7	11	13
Cuthbert	4	15	.....			
Marlboro	7	00	12	6	9	11
Chegwin	.....		5	12		

STRAWBERRIES.

The stand of strawberry plants secured in 1914 was such that a very satisfactory yield of fruit was secured during the past season. The varieties Senator Dunlap, Haverland and Beder Wood have given the best general satisfaction for the past few years. The following extract from the Report for the year ending March 31, 1915, is quoted because it appears to give a fair statement of the difficulties to be met with in the growing of strawberires, particularly in exposed locations:—

> "From our experience during the last few years, we are led to believe that it may prove advisable to defer transplanting till towards the end of May, or until the rainy season opens. The dry windy weather, so common early in May, renders it difficult to get the young plants to root uniformly. A second difficulty has been met in rooting the runners in the fall. Again at this season of the year the weather is usually dry and occasionally windy, and, frequently, the plants are blown about to such an extent that a callous is formed where the young roots should be thrown out. This condition is best offset by fastening the runners down at the point where the young plant is developing, with a forked branch of willow or with a wire staple such as is used for fencing."

The following everbearing varieties have produced at the rate of about 3,000 quarts per acre: Americus, Model, Progressive, Iowa.

The chief advantage of the everbearing varieties consists in the fact that they produce fruit out of season for ordinary varieties. The Americus, Progressive, Model, and Iowa are the varieties fruiting and the order in which they have been named is the order of their yield.

VEGETABLES.

The season was favourable to the production of a good yield of most vegetables and the quality has been fully up to the usually high standard of this class of crop in Western Canada.

BEANS.

A fairly large number of varieties of beans were grown, the seed being sown in the open on May 31. The yields shown are from one row 30 feet in length. The dates when the different varieties were ready for the table are also given, together with the average (when available) for the past five years:—

Variety.	Ready for use.	1915.		Average for 5 years.	
		lb.	oz.	lb.	oz.
Refugee or 1000 to 1	Aug. 18..	43	3	15	03
Extra Early Valentine	" 15..	20	4		
Extra Early Refugee	" 16..	17	8	15	15½
Bountiful	" 18..	14	0	26	8
Fordhook Favourite	" 18..	10	9		
Wardwell Kidney Wax	" 13..	7	0	9	5
Grennell Rustless Wax	" 18..	6	10	12	11½
Valentine Wax	" 16..	5	1	11	12

An experiment similar to that carried on with peas was conducted with beans. Stringless Green Pod, Refugee or 1,000 to 1, Early Red Valentine and Round Pod Kidney were sown April 19 and at intervals of one week up to May 10. The yield from the rows first planted was 48 pounds greater than from rows sown last, which is further evidence of the advisability of early planting even though the danger of frost is incurred.

BEETS.

Six varieties of beets were sown on May 13 in rows 30 feet in length. Weather conditions did not check the growth of beets as has sometimes been the case here and the varieties named were ready for use on July 24. The table following shows the yield for 1915, together with the average (when available) for the past five years:—

Variety.	1915.		Average for 5 years.	
	lb.	oz.	lb.	oz.
Eclipse (4 year)	106	00	80	07
Ruby Dulcet	90	00	65	14
Cardinal Globe	79	00		
Crosby Egyptian	74	00		
New Meteor	69	00	59	8
Black Red Ball	43	8	42	02½

CABBAGE.

The largest number of varieties of cabbage grown thus far were seeded in 1915 and the yield proved quite satisfactory. There was some injury from cutworm, but this was not so serious as to interfere to any extent with the yield. The following table gives the results for the past season and the average yield from ten heads of these varieties for the past five years in every instance where a variety has been grown for that length of time:—

Variety.	1915.		Average weight of ten heads for 5 years.		
	Weight of ten heads.				
	lb.	oz.	lb.	oz.	
Fottler Improved Brunswick	82	14	81	05	(4 yr)
Nofalt	84	01	..	..	
Copenhagen Market	78	11	123	01¼	
Improved Amager Danish Roundhead	73	15	92	02½	
Flat Swedish	71	12	101	12	
Extra Amager Danish Roundhead	66	3			
Danish Summer Ballhead	45	10	73	02	
Early Jersey Wakefield	30		64	14	
Early Paris Market	28	2	62	15	(4 yr)

RED CABBAGE.

Variety.	1915.		Average for 5 years.		
	lb.	oz.	lb.	oz.	
Danish Stonehead	37	4	34	5	
Danish Delicatesse	53	1	44	5½	(4 yr)

CELERY.

Seed of eight varieties of celery was sown in the hotbed on May 4, pricked out into the cold frame on June 7 and each seeded in the open on July 20. The growth of celery was not as satisfactory as many of the other vegetables and the size of the heads produced was comparatively small. The table given herewith shows the yield for 30 plants for the past five years, and the average for that period.

Variety.	1911		1912		1913		1914		1915		Average weight of 30 plants for 5 years.	
	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.
Evans Triumph	19	00	37	00	38	00	44	00	14	06	30	07½
Giant Pascal	21	00	43	00	35	00	33	00	15	10	29	08
Noll Magnificent	18	00	34	00	37	00	40	8	12	09	28	06½
French Success	14	00	37	00	31	00	24	00	14	00	24	00
White Plume	..	..	..	..	21	00	29	00	10	08	20	03
Paris Golden Yellow	5	00	16	00	19	00	14	08	10	08	13	00
Improved White Plume	..	..	..	..	..	..	12	08	13	00	12	12

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CAULIFLOWER.

Success with cauliflower during the past season was also not particularly marked, though there were a number of very fair-sized heads and the first were ready for use a month earlier than in 1914. The two earliest varieties were Early Snowball and Improved Dwarf Erfurt. From the experience of other years these varieties can be recommended as being the best sorts.

CARROTS.

Seed was sown in the open on April 17, and the vegetables were ready for use on July 7. Improved Nantes and Improved Danvers Half Long were the two earliest varieties, while Half Long Chantenay produced, as usual, one of the most satisfactory yields.

An experiment was carried on with carrots in which thinning to different distances apart was tried, and the table below gives the yield from a row 33⅓ feet in length.

	Distance Thinned.		
	1".	2".	3".
Variety.	Lb.	Lb.	Lb.
Chantenay	99	90	80

CORN.

It is the exception rather than the rule here that two seasons in succession should be favourable for corn. Seed of the following varieties was planted on May 7: Malakoff, Early Malcolm, Early Fordhook, Pocahontas, Extra Early Market, Early Iowa, White Squaw, Extra Early Adams, Golden Bantam, Metropolitan, Early Dawn.

The varieties were ready for use on the table in the following order:—

August 21—White Squaw, Early Dawn, Extra Early Adams.
September 8—Pocahontas.
" 9—Metropolitan.
" 11—Extra Early Market, Early Fordhook, Early Iowa.
" 12—Golden Bantam.
" 14—Early Malcolm.

CUCUMBERS.

The following varieties of cucumbers were sown in hills on May 5: Extra Early Russian, Prize Pickle, Fordhook Famous, Giant Pera, Davis Perfect, Cool and Crisp, Peerless, Improved White Spine.

A satisfactory growth of most varieties was made and while no fruit was ripened, it was far enough advanced for the making of good quality pickles. Improved White Spine and Giant Pera were the best yielders.

LETTUCE.

Seed of the following varieties of lettuce was sown in the open on April 13: Iceberg, Grand Rapids, Improved Hanson, Giant Crystal Head, Simpson Black Seed, Cos Trianon, Dreer All Heart.

They were practically all ready for use by the end of June, but the quality of the varieties differed widely, Dreer All Heart, Iceberg, Giant Crystal Head being among the best varieties.

ONIONS.

Seed of the following varieties of onions was sown in the open on May 13, and all of each produced a very satisfactory crop: Very White Pearl, Early White Barletta, White Queen, Australian Brown, Early Red Flat, Yellow Globe, Red Globe, White Globe, Yellow Globe Danvers, Red Wethersfield, Extra Early Red, Johnson Dark Red Beauty, Giant Red Wethersfield.

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The following table shows the relative earliness of these varieties together with the yield from a row 30 feet long of each, they being named in the table in the order of their production.

Date ready for use.	Variety.	Yield.
		lb. oz.
July 26	Yellow Globe	40 00
" 26	White Globe	33 08
" 26	Red Globe	33 00
" 24	Early Red Flat	32 08
" 26	Giant Red Wethersfield	32 08
" 24	Extra Early Red	32 00
" 28	Yellow Globe Danvers	32 00
" 24	White Queen	31 08
" 26	Johnson Dark Red Beauty	31 00
" 28	Red Wethersfield	30 00
" 24	Early White Barletta	22 00
" 28	Australian Brown	14 00
" 24	Very White Pearl	11 08

Three varieties of onions, Extra Early Red, Large Red Wethersfield and Yellow Globe Danvers were used in the following three tests:—

1. Grown from seed sown in the open and thinned to one, two and three inches apart.

2. Grown from young plants started in the hotbed and transplanted to open ground.

3. Onion sets grown from seed.

The following table gives the yield from a row 33⅓ feet in length:—

Variety.	Thinned to		
	1"	2"	3"
	lb. oz.	lb. oz.	lb. oz.
Large Red Wethersfield	24 00	21 08	15 00
Yellow Globe Danvers	25 08	21 00	16 00
Extra Early Red	31 04	21 00	15 08

Grown from seed sown in the open. Yield from one row 50 feet in length.		Grown from seed sown in the hotbed and transplanted. Yield from one row 50 feet in length.	
Variety.	Yield.	Variety.	Yield.
	lb. oz.		lb. oz.
Large Red Wethersfield	33 00	Large Red Wethersfield	39 00
Yellow Globe Danvers	31 00	Yellow Globe Danvers	40 08
Extra Early Red	28 00	Extra Early Red	58 00

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Grown for sets from seed:—

Variety.	Yield of sets from one row 100 feet in length.	
	Lb.	oz.
Large Red Wethersfield	128	00
Yellow Globe Danvers	103	00
Extra Early Red	98	00

The seeding of onions in rows one foot apart with 200 seeds to the foot gave a remarkable yield of onion sets of the following varieties: Large Red Wethersfield, Yellow Globe Danvers.

At six cents per pound the yield of sets would be worth at the rate of $3,000 per acre.

PARSNIPS.

Two varieties of parsnips were grown, Hollow Crown and Vaughan Intermediate. Both were large enough for use on July 29, and both are satisfactory as to yield.

An experiment similar to that carried on with carrots was conducted in which the parsnips are thinned to different distances apart. The following table gives the yield from a row 33⅓ feet in length:—

Variety.	Distance Thinned.		
	1″	2″	3″
Hollow Crown	72 08	75 00	63 00

PEAS.

Sixteen varieties of peas were tested in 1915, each in one row 30 feet long. Seed was sown in the open on May 19. The following table arranged in order of yield also shows the relative earliness of these varieties. There is no garden crop which succeeds better than peas under the soil and climatic conditions here, and in no year has there been a failure of this crop and the quality is all that could be desired.

Date ready for use.	Variety.	Yield, green pods	
		Lb.	oz.
Aug. 3	Advancer	29	14
July 29	Telephone	29	06
Aug. 3	Lincoln	28	00
July 24	Gradus	22	08
" 15	Thomas Laxton	20	08
Aug. 8	Stratagem	19	12
July 24	Early Giant	16	00
Aug. 7	Juno	15	14
July 15	Gregory Surprise	14	10
" 24	English Wonder	14	01
" 24	American Wonder	13	05
Aug. 3	Heroine	11	00
" 3	Dainty Duchess	8	08
July 24	Premium Gem	7	13
Aug. 3	Quite Content	7	08
July 26	Sutton Excelsior	6	00

Gradus, Advancer, Improved Stratagem and Thomas Laxton varieties of peas were planted on the 19th of April. Gradus, the earliest of these, was ready for use July 14, while the latest variety, Improved Stratagem was ready for use August 7. The variety Thomas Laxton was planted on April 19 and at intervals of one week for four weeks. The planting of a succession of varieties produced peas ready for use for a longer time than the same variety planted at weekly intervals. The four varieties came into use over a period of twenty-three days, while the one variety planted twenty-eight days apart produced peas ready for use only fourteen days later than those from the first planting.

LEEKS.

Two varieties of leeks were planted in rows thirty feet in length and produced as indicated below:—

English Flag	41 pounds.
French Carenton	53 "

PUMPKIN.

Three varieties of pumpkin were planted on June 26, the varieties being Sweet as Sugar, Jumbo and Large Field.

RADISH.

Radishes may always be counted on to make a good growth and to be ready for use on the table early in the season. Scarlet Turnip White Tipped is one of the best varieties and can be recommended for table use. This variety was ready for use on May 17.

RHUBARB.

The following varieties of rhubarb are under test at this Station: Paragon, Prima Donna, Victoria, Early Scarlet, Tolbosk, Excelsior, Queen, Royal Albert, Daw Champion, Early Raspberry, Hobday Giant, Linnaeus, Monarque.

The table following gives the varieties in the order of their yield and the relative earliness of same and the yield from 10 plants:—

Date.	Variety.	Yield.
		Lb. oz.
May 8	Victoria	89 13
" 10	Early Scarlet	74 10
" 8	Paragon	55 10
" 16	Prima Donna	51 00
" 8	Hobday Giant	49 00
" 19	Tolbosk	33 00
" 18	Queen	28 15
" 8	Linnaeus	21 00
" 18	Royal Albert	19 12
" 8	Daw Champion	19 10
" 8	Early Raspberry	19 05
" 10	Monarque	17 08

SALSIFY.

Though only one variety, Long White, was grown from seed sown in the open on May 13, it made a vigorous growth and was ready for use on July 24.

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SQUASH.

The following varieties of squash and vegetable marrow were tested: Delicious, Early White Bush Scallop, Delicata, Long White or Vegetable Marrow, Long White Bush Marrow, Golden Hubbard, Summer Crookneck.

Of these varieties the Long White Bush Marrow gave the highest yield with the Delicata Squash standing second. None of these varieties obtained full maturity though they were sufficiently far advanced to be suitable for use on the table.

TOMATOES.

Eleven varieties of tomatoes were sown in 1915. A large crop of green fruit was being carried when the frost of September 13 prevented further development.

TURNIPS.

Eight varieties of turnips for table use were planted in heavy black loam soil in 1915, and all were ready for use on August 26. The following table gives the yield of varieties from a 30-foot row:—

Variety.	Yield.	
	Lb.	oz.
Swede Favorite	101	00
Westbury	87	08
Sutton Champion	85	08
Bangholm Purple Top	85	00
Skirving	84	08
Hall Westbury	80	00
Invicta	79	00
Best of All	70	00

POTATOES.

Thirty-one varieties of potatoes were tested out at this Station in duplicate uniform test rows each 66 feet in length. The sets were placed 1 foot apart in rows 2½ feet apart. All varieties were planted May 18 and harvested October 7. The land on which these were grown was broken from scrub in 1913 and grew wheat in 1914 without being backset.

The sprouted varieties were put to sprout in a light place on May 5 and planted on June 3. When planted they came up several days in advance of those not sprouted and showed superior vigour throughout the growing period. The yield was considerably above that obtained from the same varieties which were not sprouted.

Variety.	Date planted.	Date harvested.	Total Yield per acre.		Percentage Marketable.	Percentage non-Marketable.	Form and colour.
			Bush.	lb.			
Table Talk (Sprouted)	May 18	Oct. 7	484		89	11	Round, white.
Epicure	" 18	" 7	448	48	82·7	17·3	Round, white.
Houlton Rose	" 18	" 7	446	36	87·8	12·2	Half long, pink.
Early Hebron	" 18	" 7	440		90·8	9·2	Half long, pink.
Early Ohio (Sprouted	" 18	" 7	431	12	91·2	8·8	
Rawlings Kidney, (Ashleaf Kidney)	" 18	" 7	429		92·3	7·7	Round, white.
Empire State	" 18	" 7	426	48	84·6	15·4	Long, white.
British Queen	" 18	" 7	426	48	90·4	9·6	Half long, white.
Early Norther	" 18	" 7	422	24	87·1	12·9	Half long, red.
American Wonder	" 18	" 7	418		87	13	Half long, white.
King	" 18	" 7	415	48	88·9	11·1	Half long, white.
Country Gentleman	" 18	" 7	409	12	87·3	12·7	Half long, pink.
New Queen	" 18	" 7	398	12	89	11	Half round, pink.
Money Maker	" 18	" 7	391	36	88·8	11·2	Long, white.
Morgan Seedling	" 18	" 7	389	24	89·4	10·6	Long, pink.
Late Puritan	" 18	" 7	385		88·6	11·4	Half long, white.
Table Talk	" 18	" 7	378	24	91·2	8·8	Round, white.
King Edward 7th	" 18	" 7	327	48	83·6	16·4	Half round, white, pink eye
Wee MacGregor	" 18	" 7	327	48	92·1	7·9	Round white.
Holborn Abundance	" 18	" 7	325	36	85·3	14·7	Round, white.
Rochester Rose	" 18	" 7	323	24	83·4	16·6	Half round, pink.
Carman No. 1	" 18	" 7	316	48	91·8	8·2	Half long, white.
Gold Coin	" 18	" 7	316	48	89·9	10·1	Half round, white.
Early Ohio	" 18	" 7	299	12	85·8	14·2	
Dreer Standard	" 18	" 7	290	24	90·1	9·9	Half round, white.
Irish Cobbler	" 18	" 7	286		86·	14·	Round, white.
Vick Extra Early	" 18	" 7	277	12	92·4	7·6	Round, white.
Hard to Beat	" 18	" 7	220		81·	19	Half long, white.
Dalmeny Beauty	" 18	" 7	220		64·9	35·1	Half long, white.
Cow Horn	" 18	" 7	213	24	69	31	
S. A. Frostproof	" 18	" 7	187		76·9	23·1	Half long, red.

COST OF PRODUCING AN ACRE OF POTATOES.

The following table shows the time spent in the various operations in producing an acre of potatoes during the season of 1915 at this Station:—

May	12—Double harrowing, 1 man and 4 horses	hrs. 1
"	13—Furrowing, 1 man and team	" 2½
"	13—Covering, 1 man and team	" 2½
"	13—Planting, 2 men	" 10
"	13—Cutting potatoes, 1 man	" 8
"	20—Packing, 1 man and 2 horses	" 1
June	4—Harrowing, 1 man and team	" 1
"	22—Harrowing, 1 man and team	" 1¼
Oct.	5—Digging, 1 man and 4 horses	" 2¼
"	5—Digging, 8 men	" 7½
"	5—Hauling, 2 men and team	" 4

Cost Items.

1 man and 4 horses, 3¼ hours	$ 1 56
1 man and 2 horses, 12¼ hours	4 17
1 man and 1 horse, 2¾ hours	74
Manual labour, 98 hours	19 60
Formalin used on seed	1 25
Seed used, 22 bushels at 50 cents	11 00
Rent of land	2 00
Total cost	$ 40 32
Cost to produce and put in cellar per bushel	14·66
Returns, 1,650 pounds at 40 cents per bushel	110 07
Profit on 1 acre	69 75

An experiment was conducted with cutting the sets to one, two, and three eyes and planting whole small potatoes. The yields below were secured from rows each 66 feet long and the rate per acre in bushels and pounds is also shown:—

	American Wonder Yield from 66 sets.	Gold Coin Yield from 66 sets.	Average weight 66 sets planted.		Average yield per acre.	
	lb.	lb.	lb.	oz	Bush.	lb.
Whole Potatoes	92	85	5	15	389	24
Sets cut to 3 eyes	112	72	3	09	404	48
Sets cut to 2 eyes	43	70	4	09½	248	36
Sets cut to 1 eye	98	74	5	15¼	378	24

One row each of Table Talk and Early Ohio potatoes was planted on five different dates two weeks apart. The sets were carefully weighed and counted each time and planted under the same conditions as far as possible in order that the variation in yields other than that occasioned by the dates of planting would be at a minimum.

Date planted.	Table Talk.	Early Ohio.	Average yield per acre.	
	lb.	lb.	Bush.	lb.
May 5	116	100	475	12
" 19	104	84	413	36
June 3	64	36	220	00
" 16	42	44	189	12
" 30	27	38	141	40

FLOWER GARDEN.

The following varieties of annuals were sown in the hotbed on April 7. The bloom continued until the severe frost of September 13:—

	In Bloom.	
	From	To.
Abronia umbellata	August 18	Sept. 12
Alyssum, Little Dorrit	" 13	" 12
Antirrhinum, 11 varieties	" 24	" 12
Asters, 29 varieties	" 22	" 12
Balsam, Improved Camellia Flowered	" 20	" 12
Bartonia aurea	" 20	" 12
Browallia	" 21	" 12
Carnation	" 1	" 12
Chrysanthemum	" 13	" 12
Coreopsis	" 20	" 12
Dahlia	" 28	" 12
Dianthus Heddewigii	" 26	" 12
Dimorphotheca	" 12	" 12
Daisy	" 30	" 12
Eschscholtzia	" 13	" 12
Gaillardia	" 28	" 12
Geranium, 6 varieties	" 16	" 12
Larkspur, 3 varieties	" 26	" 12
Lavatera rosea splendens	" 16	" 12
Leptosiphon hybridus	" 16	" 12
Linum	" 26	" 12
Lobelia, 2 varieties	" 26	" 12
Lupinus	" 13	" 12
Marigold, 2 varieties	" 20	" 12
Mimulus	July 12	" 12
Mignonette	Aug. 6	" 12
Nasturtium, 9 varieties	" 9	" 12
Petunia, 3 varieties	" 20	" 12
Phlox, 7 varieties	" 16	" 12
Portulaca	" 22	" 12
Rudbeckia	" 26	" 12
Salvia, Snowball	" 28	" 12
Salpiglossis, 2 varieties	" 26	" 12
Scabious	" 31	" 12
Schizanthus	" 16	" 12
Stock, 7 varieties	" 13	" 12
Swan River Daisy	" 16	" 12
Sweet Sultan, 2 varieties	" 23	" 12
Tagetes signata pumila	" 16	" 12
Verbena, 3 varieties	" 26	" 12
Viscaria cardinalis	" 3	" 12
Zinnia, 2 varities	" 24	" 12

The following varieties of Everlasting were tested:—

	In Bloom.	
	From.	To.
Acroclinium	Aug. 10	Sept. 12
Helichrysum	" 26	" 12

LACOMBE.

Seventy varieties of sweet peas were tested here in 1915 and were planted on April 12. The following varieties are named as representing superior sorts of the various shades:—

Queen Alexandra	Crimson.
Helen Pierce	Marbled blue.
Miss Wilmott	Salmon pink.
Mrs. Collier	White.
Rose du Barri	Scarlet.
John Ingman	Blush.
Mrs. Routzahn	Primrose.
Clara Curtis	White.
King Manoel	Maroon.
Princess Mary	Blue.
Mrs. Cuthbertson	White—pink edge.
Irish Blue	Mauve.

The following varieties of herbaceous perennials produced bloom during the past year:—

Aquilegia alpina superba.
Aquilegia cærulea hybrida.
Dianthus deltoides glaucus.
Hesperis matronalis.
Papaver aricntale Goliath.
Papaver orientale Queen Alexandra.
Papaver orientale Royal Scarlet.
Palemonium himalaicium album.
Palemonium Richardsonii.

Eight varieties of gladioli were planted in 1915, on May 5, the variety Willy Wigman being the only one producing bloom.

The following varieties of pæonies produced bloom during the past season: Eclatante, Louis Van Houtte, *Globosa grandiflora,* Delaelin, Edulis, Baronne James de Rothschild, Victor Lemoine, Charles van Geart.

DAFFODILS.

Daffodils of the following varieties produced bloom in 1915:—

	In Bloom..	
	From	To.
Horsfieldii	May 27	June 22
Victoria	" 29	" 19
Sir Watkin	" 27	" 19
Emperor	" 27	" 21

TULIPS.

Thirty-one varieties of tulips were grown during the past season and produced splendid bloom:—

	Height Inches.	In Bloom.	
		From.	To.
Late Singles, including Darwins.			
York and Lancaster	6	June 12	June 25
Gesneriana Spathulata	12	" 12	" 25
Isabella	8	" 7	" 25
La Merveille	10½	" 12	" 28
Rose Pompon	9	" 7	" 25
Parrot, Perfecta	8	" 10	" 25
Picotee	10	" 10	" 30
The Fawn	11	" 10	" 25
Inglescombe Yellow	11	" 12	" 25
Clara Butt	8½	" 12	" 25
Madame Krelage	8½	" 7	" 25
Farncombe Sanders	9	" 10	" 25
Suzon	12	" 10	" 25
Isis	11	" 10	" 25
Baron de la Tonnaye	16	" 14	" 25
Bartigon	7½	" 10	" 25
Pride of Haarlem	10	" 7	" 19
Edmee	13	" 10	" 19
Europe	12	" 7	" 25
Late Doubles.			
Mariage de ma fille	10	June 15	June 25
Early Singles.			
Joost van Vondel	8	May 15	May 31
Couleur de Cardinal	8	" 30	June 12
Proserpine	9½	" 19	" 6
Keizerskroon	8½	" 26	" 14
Standard Royal Silver	5	" 31	" 15
Early Doubles.			
Murillo	7½	May 29	June 19
Imperator Rubrorum	9½	" 19	" 14
Couronne d'Or	7	" 25	" 15
Alba Maxima	6½	May 29	June 19
Helianthus	5½	" 25	" 6
Paeony Rose	6½	June 12	" 25

TREES AND SHRUBS.

The few vacancies occurring among the ornamental trees and shrubs were filled when the planting of 1915 was done. During the past season tree growth has been unusually free and if the severe winter just experienced has no injurious effects upon them, this unusual growth will advance the trees further than any previous year.

The large number of evergreens planted on the grounds is rapidly improving the general appearance of the place and though the growth of these is not rapid here they are not showing winter killing and in a few years will present a very pleasing picture.

Laurel-leaved willow continues to show itself hardy while the willow, *Salix daphnoides acutifolia* is probably the best willow for use in the planning of windbreaks in this region.

LACOMBE.

EXPERIMENTAL STATION, INVERMERE, B.C.

REPORT OF THE SUPERINTENDENT, G. E. PARHAM.

THE SEASON.

The season of 1915 was exceptionally favourable. The spring opened earlier than usual, and by the end of March the land had been cultivated, and the bush fruits and apple trees were in course of being pruned.

There was a long dry spell after the snow disappeared, and the high winds caused the light soil to drift considerably. This condition, however, was remedied by over 1 inch of rainfall on the 29th and 30th of April, and from that date there was an abundant precipitation. Light showers in May, nearly four inches in June, and almost the same amount in July made irrigation unnecessary until August. There was a severe frost on the night of May 29, which did considerable damage to the early potatoes, young cabbage, etc. With this exception the conditions were most favourable throughout the season.

The weather in the fall was such as enabled the harvesting of the various garden crops in good condition.

VEGETABLES (VARIETY TESTS).

Asparagus.—The asparagus planted in 1913 continues to make satisfactory growth. A few bunches only were cut this season, and a liberal dressing of barnyard manure has been again applied.

Beans.—Ten varieties were tested. They were sown on May 13 in rows 30 feet long. No irrigation was required.

Variety.	Ready for use.	Total Yield.
		lb.
1. New White Seeded Stringless	Aug. 3	32
2. Bountiful Green Bush	Aug. 1	45
3. Grennell Rustless Wax	July 26	35
4. Refugee or 1000 to 1	July 26	41
5. Round Pod Kidney	Aug. 1	36
6. Stringless Green Pod	Aug. 4	50
7. Valentine Wax	Aug. 1	40
8. Wardwell Kidney Wax	July 23	28
9. Extra Early Valentine	Aug. 4	50
10. Extra Early Refugee	Aug. 7	48

It is perhaps noteworthy that varieties 9 and 10, described as "Extra Early" are, under local conditions, the latest in maturing of any varieties tested.

Beets.—Were sown in rows 30 feet long on April 28, thinned June 8, and were ready for use on July 17.

Variety.	Yield per 30' row.	Remarks.
	lb.	
1. Ruby Dulcet	115	Rather large, but clean rooted.
2. Rennie Cardinal Globe	105	Large and coarse.
3. Eclipse	110	Rather coarse.
4. New Meteor	80	Good shape medium size and clean rooted.
5. New Early Black Red Ball	90	Good shape, medium size
6. Crosby Egyptian	100	Large coarse.

Brussels Sprouts.—"Dwarf Improved" were again tested and gave excellent results.

Cabbages.—Eleven verieties were tested being sown in the open on May 3. All varieties germinated well but they were soon affected with Cabbage Maggot. "Paris Market" was the earliest as well as one of the best varieties grown, being ready for use by July 22 and followed on the 28th by the Early Jersey Wakefield. Three other varieties which did well were Fottler Improved, Flat Swedish and Danish Delicatesse.

Variety.	Ready for use.
1. Fottler Improved	Aug. 30
2. Improved Amager Danish Round Head	Aug. 30
3. Extra Amager Danish Roundhead	Aug. 30
4. Flat Swedish	Aug. 20
5. Danish Summer Ballhead	Aug. 30
6. Copenhagen Market	Aug. 13
7. Paris Market	July 22
8. Early Jersey Wakefield	July 28
9. Nofalt	Aug. 15

Danish Delicatesse and Danish Stonehead, two varieties of pickling cabbage, both did well.

Cauliflower.—Three varieties, Danish Giant, Early Dwarf Erfurt and Snowball were tested. They were sown in hotbed March 31, removed to cold frame April 19, planted in open May 6, and were all ready for use on July 1.

Carrots.—All four varieties tested were very good, especially Half Long Chantenay which yielded a remarkably uniform crop of clean straight roots. They were sown April 27 and thinned June 18 and gave the following yield to the 30-foot-row.

	Pounds.
1. Improved Danvers	56
2. Improved Nantes	46
3. Half Long Chantenay	100
4. Early Scarlet Horn	44

Celery.—Seven varieties were sown in the hotbed March 29, and planted out on June 12. Paris Golden Yellow was the earliest and the best variety grown, White Plume and French Success also giving excellent results.

INVERMERE.

Cucumbers.—Seven varieties were planted and, with the exception of one, "Cool and Crisp," did well. Davis Perfect was the heaviest in yield, followed by Extra Early Russian, Fordhook Famous, Giant Pera, Peerless Improved White Spine and Prize Pickle.

Corn.—Was a more successful crop than in any previous year. Fifteen varieties were sown May 14.

Name.	Height.	Description.
	Feet	
1. Early Evergreen	9	Few cobs, none ready for use.
2. White Squaw	3	Many cobs ready for use.
3. Early Iowa	5½	Many cobs in good condition for use. Best
4. Pocahontas Sweet	7	Many cobs ready for use.
5. Metropolitan Sweet	10	No cobs ready for use. (One stalk 11')
6. Early Dawn	5	Many cobs ready for use.
7. Perkins Extra Early Market	8	Many cobs ready for use.
8. Extra Early Adams	6	Short plump cobs, many ready for use.
9. Golden Bantam	7	Small, uneven, few cobs ready for use.
10. Early Fordhook	7	Many cobs but poor coarse quality.
11. Early Malcolm	5	More cobs ready for use then any, and first to become ready.
12. Malakoff	5	Cobs small and early.
13. Stowell Evergreen	10	Heavy forage, few cobs, none ready for use.
14. Black Mexican Sugar	10	Heavy forage, exceptionally long cobs, none ready for use.
15. Country Gentleman	10	Heaviest in forage, some 11' high.

Muskmelon and Watermelon.—Cannot be grown in open; in the cold frame they were grown with fair success.

Onions.—Were sown in the open. The crop, was an exeellent one all varieties doing well. Early Red Wethersfield was the best. It was found, however, though they were harvested under favourable conditions, that a large proportion of all varieties, instead of ripening, started to rot in the neck.

Pepper.—One variety, Long Red Cayenne, was again tested, but we were again unable to bring any to maturity.

Parsnips.—Both Improved Hollow Crown and Intermediate, the two varieties tested, raised successful crops of good even roots.

Peas.—The following sixteen varieties were planted April 19:—

Variety.	Ready for use.	Height.	Remarks.
		ft. in.	
1. Gradus	July 16	2	
2. Sutton Excelsior	July 14	1 6	
3. Stratagem	Aug. 4	2 3	
4. Gregory Surprise	July 9	2 3	Good.
5. Heroine	Aug. 4	2 6	
6. Telephone	July 26	4 6	Good.
7. English Wonder	July 13	2 0	Very good.
8. Juno	Aug. 4	2 6	
9. Dainty Duchess	July 26	6 0	Very good.
10. Quite Content	July 26	6 0	Good.
11. Early Giant	July 30	2 6	
12. Thos. Laxton	July 16	3 0	Good.
13. Lincoln	Aug. 5	2 3	Good, very suitable for late cropping.
14. American Wonder	July 11	2 0	Good.
15. Advancer	July 16	2 6	
16. Premium Gem	July 3	1 6	Good. Since all ripen together, good for sequence of sowing.

Potatoes.—The same experiments which have been conducted in past years were repeated this season. Thirty-seven varieties of potatoes are being tested and were planted May 18 in rows 66 feet in length, the sets being 18 inches apart in the rows and the rows 30 inches apart.

Variety.	Yield.			Remarks.
	Marketable.	Unmarketable.	Total.	
	lb.	lb.	lb.	
Table Talk	46	36	82	Scab.
American Wonder	55	21	76	Clean.
Bovee	49	40	89	Clean.
Burpee Extra Early	41	36	77	Scab.
Carman No. 1	38	38	76	Scab.
Conquering Hero	41	51	92	Scab.
Clyde	58	38	96	Scab.
Dalmeny Hero	21	48	69	Scab.
Silver King	48	35	87	Slight scab.
Manistee	45	39	80	Scab.
Late Puritan	66	46	112	Clean.
Irish Cobbler	59	29	88	Slight scab.
Houlton Rose	64	46	110	Scab.
Green Mountain	50	41	91	Slight scab.
Green Mountain 2	51	36	87	Clean.
Bermuda Early	22	36	58	Clean.
Scottish Triumph	29	42	71	Scab.
Empire State	41	37	78	Clean.
Eureka Extra Early	48	48½	96½	Slight scab.
The Factor	23	40	63	Slight scab.
Vermont Gold Coin	60	28	88	Clean.
Early Ohio	41	26	67	Clean.
Early White Albino	60	43	103	Clean.
Early Rose	47	42	89	Clean.
Early Six Weeks	37	50	87	Clean.
Early May	38	33	71	Clean.
Early Norther	52	31	83	Clean.
Early Hebron	73	21	94	Clean.
Dobbie Prolific	62	31	93	Clean.
Delaware	60	23	83	Scab.
Up to Date	60½	27½	88	Clean.
Pan American	57	13	70	Slight scab.
Wee MacGregor	87	34½	121½	Slight scab.
Sir Walter Raleigh	48	20	68	Slight scab.
Snow	68	21½	89½	Clean.
The Scott	49½	27½	77	Slight scab.
Table Talk	95	23½	118½	Scab.
Todd Wonder	48	6	54	Clean.
Cambridge Russet	66½	23½	90	Clean.
Reeves Rose	56½	27	83½	Clean.
Asheroft	96	21	117	Slight scab.
Uncle Sam	64	23	87	Clean.

Tomatoes.—Twelve varieties were tested. They were sown April 22 and planted out on June 11. The following results were obtained from one plant each of the following varieties:—

Variety.	Green fruit.	Ripe fruit.	Remarks.
	lb	lb.	
Sparkling Dewdrop	30	2	Rather poor shape.
Prosperity	36	6	Fair.
Extra Early Wealthy	30	10	Best grown this season.
Florida Special	30	4	Very fair.
Rennie XXX Scarlet Skin	21	1½	Very uneven shaped fruit.
Northern Adirondack	20	4	Good but split badly.
Bonny Best	(Plant failed) not gathered.		
Johnson Jack Rose	.....	2	Uneven in size and shape
Chalk Early Jewel	24	0	No ripe fruit.
Sunnybrook Extra Earliana	29	5	Good shape and size did not split.
Alacrity 12B	24	4	Very good fruit.
Alacrity 14B	28	½	Only one ripened.

Squash.—Were planted in hills 9 feet apart, and were sown on May 10, on land prepared with a liberal application of farm manure, and produced the following average yield per hill:—

	Pounds.
Delicata	18
Delicious	36
Crookneck Summer	20
Golden Hubbard	26
Long White	25
White Bush Scallop	50
Long White Bush	27

Egg Plant.—The Improved New York Spineless was tested this year. It was sown on April 3 and planted out on June 24; they flowered but did not set any fruit. Two plants left in the cold frame each produced one fruit.

Rhubarb.—The plants in the open did well and yielded an abundant supply in their season. Roots were taken up in the late fall, packed in moss and forced in the cellar. Forcing commenced on the 24th of November, and the plants yielded their first pulling on January 1. One root which was first ready for pulling on January 3, continued to yield until February 26, and produced a total of 9 pounds, eleven ounces.

Seakale.—Has proved most valuable, providing as it does a delicious vegetable at a time when no other fresh vegetable is obtainable. Seakale is in the first place propagated from seed, and though it takes a little longer to mature the crop than in the case of most vegetables, it more than repays the effort of those who will take the trouble. The seed is contained in a husk which may be broken prior to sowing. Sow the seed thinly in a drill 1 to 2 inches in depth in well-worked soil in the spring, and by fall the plants will be of considerable size. It will probably be wiser to leave a part of the crop in the ground for the winter (where it should be covered in localities where the temperature is likely to drop to zero) with straw manure for protection, while a number, so that there may be no risk of the year's work being lost, should be stored in the root cellar and set out again in the spring. At the end of the second season the plants will have developed, and will be removed for the winter's forcing, though some plants, protected as in the previous year, should be left in the ground for early spring forcing. Those it is intended to remove should be lifted as soon as

the leaves break away from them under slight pressure, probably about the middle of October. The root system should consist of a straight growth 6 to 9 inches long, and 1 to 2 inches thick (the forcing crown), and a number of smaller pieces 3 or 4 inches long and slightly thicker than a lead-pencil. These latter should be cut off close to the parent root and should be trimmed off squarely at the top and slopingly at the other extremity. These "whips," as they are termed, should be packed in earth in the cellar till spring in shallow boxes with the growing ends just protruding above the surface of the soil. As spring approaches these should be placed in the light and kept slightly moist until weather conditions permit their being planted out in the open. They should be planted in the open 18 inches to 24 inches apart in well manured ground. These whips in the autumn will have developed into the forcing crowns required and the method as before described will be employed to secure the next season's whips.

To return to the forcing crowns taken into the cellar in the fall. These should be packed in earth or moss. The latter method has been used this last year with entirely satisfactory results and its use has been found cleaner and more convenient, being lighter to handle and retaining the moisture better. It has proved most convenient for household use to pack about six crowns in a box say 10 inches by 18 inches by 18 inches high, leaving about 12 inches clear space above the tops of the crowns to allow room for growth, and covering the top with sacking to exclude the light, and as these crowns become exhausted another box can be brought into bearing. At an average temperature of 55 degrees F., about a month's forcing is required before the kale is ready for use though of course as spring approaches the period required for forcing becomes shorter.

The total forced growth last year averaged 16 ounces per crown. In the spring the crowns left in the open can be forced in the same manner as rhubarb for rapid forcing, or simply banked with earth and blanched. The employment of the two methods of course extends the season.

CULTURAL EXPERIMENTS WITH VEGETABLES.

During the year a series of cultural experiments was added to the work previously undertaken in the testing of varieties; an account of this branch of the horticultural work follows.

Cabbage.—To ascertain the advantage, if any, of starting plants in hotbed rather than sowing seed in open, in their permanent location:—

Variety.	Sown Hotbed.	Ready for use.	Sown Open.	Ready for use.
Early Jersey Wakefield	Mar 26	July 7	May 1	July 28
Copenhagen Market	" 26	" 19	" 1	Aug. 5
Paris Market	" 26	" 1	" 1	July 22

Cauliflower.—The same experiment as that described above for cabbage was also tried with three varieties of cauliflower:—

Variety.	Sown in Hot bed.	Ready for use.	Sown in open.	Ready for use.
Danish Giant	Mar. 31	July 1	May 3	Aug. 1
Early Dwarf Erfurt	" 31	" 1	" 3	" 1
Snowball	" 31	" 1	" 3	" 1

INVERMERE.

Celery.—Experiments were made to ascertain the relative advantage of various methods of blanching. Five rows of Golden Self-blanching were planted, and these were treated with: (1) Pliable protection; (2) boards 1-inch by 12 inches; (3) earth; (4) in trench, manured; (5) in trench, without manure.

The conclusions arrived at were that the method of blanching with pliable protection was the simplest and most expedient; especially with early varieties. We were, further, unable to see any improvement in the celery treated with manure (4) over that not so treated (5), and we found the trench method of blanching more laborious and less convenient for irrigating.

Onions.—To determine the relative value of growing plants in hotbed and sowing seed in permanent location:

Variety.	Sown in Hotbed.	Planted in open.	Length of row.	Yield in pounds.
			Ft.	
Danvers Yellow Globe	Mar. 24	May 5	100	111
Extra Early Red	" 24	" 5	100	107
Large Red Wethersfield	" 24	" 5	100	118
		Sown in open.		
Danvers Yellow Globe		April 27	100	74
Extra Early Red		" 27	100	88
Large Red Wethersfield		" 27	100	60
		Planted.		
Onion Sets		April 27	100	85

One decided advantage we found in planting out from the hotbed was the opportunity this method gave over the other in keeping the land clear of weeds.

Peas.—An experiment was made to compare the relative advantage of sowing four selected varieties at one time, as compared with sowing the same variety four times at intervals of one week, to provide a continuous supply of vegetables during the season.

The four varieties noted below were sown on April 21 in rows 50 feet long and 3 feet apart. They were chosen in the expectation of their coming into bearing in the order named, but the first three varieties were all ready for use on the same day, and all three varieties also were yielding later than the last to come into bearing.

Yields.	July 16	July 21	July 27	Aug. 5	Aug. 19.	Total.
	lb. oz.	lb. oz.	lb. oz.	lb. oz.	lb. oz.	lb. oz.
1. Thos. Laxton	1 11	1 11	8 0	6 0	8 0	25 6
2. Gradus	3 0	1 9	6 8	.....	6 0	17 1
3. Advancer	1 6	2 7	6 0	12 0	8 0	29 13
4. Stratagem	.....	.....	.....	22 0	.....	22 0

Nos. 2, 3 and 4 were compared with three sowings of Thos. Laxton, sown on April 28, May 5, and May 12, which yielded as follows:—

Yields.	July 20	July 22	July 27	Aug. 3	Aug. 5	Total.
	lb. oz.	lb. oz.	lb. oz.	lb. oz.	lb. oz.	lb. oz.
2. Thos. Laxton	5 3	3 14	12 0	18 0	10 0	32 1
3. Thos. Laxton	.....	.....	6 0	6 0	6 0	30 0
4. Thos. Laxton	.....	.....	.....	....	22 0	28 0

A row of each of the four varieties used in the above tests was allowed to ripen seed to ascertain the practicability of raising seed economically. The following quantities were threshed:—

Thos. Laxton	48 pounds.
Gradus	30 "
Advancer	50 "
Stratagem	30 "

Potatoes.—A number of experiments were made to ascertain the relative suitability of small uncut and cut potatoes with a different number of eyes, for seed purposes. The results of these experiments follow:—

——	Large.	Small.	Total.
	lb.	lb.	lb.
Wee MacGregor...Small uncut, 1 ft. apart. Planted May 18. Rows 30 inches. Yield	33	29	62
Wee MacGregor...Cut to 1 eye 1 ft. apart. Planted May 18. Rows 30 inches. Yield	18	18	36
Wee MacGregor...Cut to 2 eyes 1 ft. apart. Planted May 18. Rows 30 inches. Yield	24	23	47
Wee MacGregor...Cut to 3 or more eyes, 1 ft. apart. Planted May 18. Rows 30 in. Yield	17	17	34

Early Hebron and Table Talk were the varieties used to experiment with the different distances apart both of the rows and in the rows:—

——	Large.	Small.	Total.
	lb.	lb.	lb.
Early Hebron rows 30 inches apart, plants 12 inches apart yielded	48	37	85
Early Hebron rows 30 inches apart, plants 14 inches apart yielded	42	30	72
Early Hebron rows 36 inches apart, plants 12 inches apart yielded	61	43	104
Early Hebron rows 36 inches apart, plants 14 inches apart yielded	61	44	105
Table Talk rows 30 inches apart, plants 12 inches apart yielded	25	16	41
Table Talk rows 30 inches apart, plants 14 inches apart yielded	23	21	44
Table Talk rows 36 inches apart, plants 12 inches apart yielded	56	26	82
Table Talk rows 36 inches apart, plants 14 inches apart yielded	57	20	77

The relative advantage of using sprouted or unsprouted sets was also tested with two varieties viz.: Irish Cobbler and Wee MacGregor. These were planted at the same time, on May 18, the sprouted potatoes having been allowed to sprout in the cellar. Both were ready for use at the same time and yielded as follows:—

——	Marketable.	Small.	Total.
	lb.	lb.	lb.
Irish Cobbler (sprouted)	57	20	77
" (unsprouted)	51	28	79
Wee MacGregor (sprouted)	87	16	103
" (unsprouted)	80	18	98

The above were planted in rows 2 feet 6 inches apart, sets 12 inches apart in rows, and rows 100 feet long.

INVERMERE.

IRRIGATION TEST.

Three varieties of potatoes were tested, one without irrigation and each of the others with one and two irrigations respectively. Rows as before 100 feet long, distance apart 2 feet 6 inches and sets 12 inches apart in the row. The following results were obtained:—

Variety.	Method.	Market-able.	Un-Market-able.	Total.
		lb.	lb.	lb.
Sir Walter Raleigh	No irrigation	150	54	204
Wee MacGregor	"	115	64	179
Conquering Hero	"	136	60	196
Sir Walter Raleigh	One irrigation	144	63	207
Wee MacGregor	"	185	80	265
Conquering Hero	"	176	83	259
Sir Walter Raleigh	Two irrigations	155	45	200
Wee MacGregor	"	179	81	260
Conquering Hero	"	120	68	188

Tomatoes.—The following cultural experiments were made with tomatoes: Sown in hotbed March 23, in cold frame April 19, planted in open June 11. 25 plants used:

Bonny Best, unpruned, no supports, 4 feet by 4 feet apart, 140 lb. green, none ripe.

Bonny Best, pruned to one stem and tied to stakes, 2 feet by 4 feet apart, 40 lb. green, 6 lb. ripe.

Bonny Best, pruned to two stems and tied to stakes, 2 feet by 4 feet apart, 71 lb. green, 1 lb. ripe.

LAWNS, FLOWERS AND HEDGES.

During the year much was done to improve the appearance of the Station by the sowing of lawns and by transplanting into permanent locations a number of ornamental hedges, roses, pæonies, iris, etc.

A number of native hedges have also been planted, and seem to have withstood the winter well.

The flower garden was located in a new position on land which had not been cultivated until preparation for the garden was made in the spring. For this reason, seeds planted were late in germinating, though towards the end of the season there was a most attractive display. A number of geraniums were sent to us from Ottawa which did well and cuttings were taken in the fall but only a few survived as we have no place to keep them but a fairly lighted cellar. The sweet peas made a magnificent showing; the twelve best varieties being: Etta Dyke, Illuminator, Lilian, Helen Pierce, Tennant Spencer, Florence Nightingale, Scarlet Emperor, Princess May, Helen Grosvenor, Decorator, Nubian, Barbara.

Pæonies.—These made a splendid showing along the west fence early in July and continued in bloom until the third week of July. Couronne D'Or, Duchesse de Nemours and Felix Crousse were among the earliest bloomers and made the finest show.

Bulbs.—The tulips planted in the autumn of 1914 along the rising ground bordering the lawns made a fine show in April and May of this year. The daffodils also planted along the west ditch line did much better than in the drier location of last year.

INVERMERE.

The hyacinth bulbs set in the autumn of 1915 were planted in window boxes and pots indoors and started in the basement. These made a splendid show all through the months of February and March. A few snowdrops, tulips and daffodils were also planted in window boxes, and these also are doing exceedingly well.

APPLES.

All varieties of apples made good growth during the summer of 1915, but, owing to the exposed position of the orchard at the Experimental Station, three timese during the past winter the snow completely disappeared, and this, together with the exceptionally low temperatures, has resulted in the killing of many of the tender varieties.

The crabs, Wealthy, Yellow Transparent, and some hardy varieties received from the Central Experimental Farm promise well. Cover crops and other cultural experiments started in 1913, have been continued in the orchard.

BUSH FRUITS.

Gooseberries.—The Oregon Champion gooseberries bore a good crop there being an average of 5 pounds ber bush. All the other varieties were attacked by mildew.

Black Currants.—A fair crop of black currants was obtained.

Red Currants.—Came into bearing for the first time and yielded a light crop.

Raspberries.—The raspberry crop promised well but it was badly attacked by the red spider before the fruit fully matured. The bushes were thoroughly sprayed with a mixture of coal oil, soap and rain water. The old fruiting canes were cut out on August 17.

INVERMERE.

EXPERIMENTAL STATION, SUMMERLAND, B.C.

REPORT OF THE SUPERINTENDENT, R. H. HELMER.

This is the first annual report of the horticultural work carried on at the Experimental Station, Summerland, B.C., but as it was not possible to do much experimental work this year, there is not much to report on.

The season of 1915 was very promising for unirrigated crops in the spring, but as usual July and August were very trying on growing crops. Field beans of which a number of varieties were planted made good growth, receiving very little water, and a fair crop of good beans was harvested. These were threshed through a grain separator with all teeth removed from the cylinder and concave; it cleaned the beans very well but too many were split and the varieties were somewhat mixed.

A few apple trees only were planted to see if they would become established without irrigation, namely, 20 Delicious, 20 Duchess, 20 Wagener, 20 Jonathan, and 20 Rome Beauty; these did very well without any irrigation. Out of the lot, three died and they were in very hard spots where an old road had been. All the trees were wrapped early in the fall as there are quite a few jack rabbits in the sage brush surrounding the Station and they come to feed on the clover and alfalfa.

The Soy beans with the exception of Quebec No. 92 did not produce pods to any extent. The main crop produced hardly any but made splendid growth. They were left growing as long as possible as they had flowered so late and a few beans were forming. The plants had to be cut with a mower as they were so hard to plough under, and they were harvested for bedding the horses. It was found that the horses would leave any other fodder to eat their bedding and an improvement in their coats has been noticed.

Bulbs from the Sidney Station and also those from Holland arrived in good condition and were planted. The Sidney bulbs have been kept by themselves that they may be compared with the others.

Some tomatoes were grown on a very sandy patch of ground near the stable with very good results. They were hotbed plants set in the open and there were ripe tomatoes on July 8, and a heavy crop of fruit during the summer.

The trees planted in the spring of 1915 came through the winter well.

Hotbeds were started in March, 1916, and by the end of the month they were filled with plants ready to go out when the weather became warmer.

There is every indication of a big apple year in this district; and peaches, apricots, and sweet cherries are not as much damaged by the severe winter as was at first thought. Many experiments with fruits, vegetables, and flowers will be started at this Station in 1916.

EXPERIMENTAL FARM, AGASSIZ, B.C.

REPORT OF THE SUPERINTENDENT, P. H. MOORE, B.S.A.

The horticultural work at this Farm has been subject to many changes of men and the past year has not been an exception. J. D. Brydon, who had charge for a year, enlisted for overseas service in May and at this date it was rather difficult for a new man to pick up the work. However, a great deal of variety test work was done and some few experiments.

The spring was a very early one and all planting was done correspondingly early. The show of early bloom was good, and this show was kept up until the dry weather in July checked it. August and September were exceptionally hot and dry causing much damage in the vegetable as well as the flower garden. The autumn was wet but not severe and many of the shrubs and perennial plants went into winter in a very soft condition. The winter was the worst on record for both cold and duration of cold. Many types of plants were badly damaged by the cold winds. Douglas fir, Thuya, Yew, Catalpa, Holly, Boxwood, Rhododendron, and Laburnum were among the trees and shrubs showing the most damage. The spring is very wet and late and by March 31 there is very little bloom showing and very little planting done.

POTATOES.

TEST OF VARIETIES.

The following varieties of potatoes were grown in plots of 1/132 of an acre with the results indicated in the table:—

No.	Name of variety.	Size.	Season.	Date of planting.	Date of digging.	Total yield per acre.		Yield marketable per acre.		5 yr. average marketable per acre.		Form and Colour.
						tons.	lb.	tons.	lb.	tons.	lb.	
1	Gold Coin	Large	Late	May 3	Sept. 25.	14	248	12	1,344	10	1,323	Round White.
2	American Wonder	Large	Medium to late	" 2	" 24	15	724	13	1,324	9	1,522	Long White.
3	Dreer Standard	Large	Medium to late	" 2	" 24	15	96	13	1,720	9	1,314	Round White.
4	Empire State	Large	Late	" 2	" 22	14	1,568	13	796	9	551	Long White.
5	Dalmeny Beauty	Large	Late	" 2	" 24	7	1,444	6	936	9	263	Flattish White.
6	Morgan Seedling	Large	Medium to late							8	1,605	Long Red.
7	Early St. George	Medium	Early	Apr. 30	" 10	12	1,542	11	1,232	8	1,560	Long Red.
8	Rawlings Kidney	Large	Medium early	30	" 22	14	116	12	948	8	1,436	Long White.
9	Carman No. 1	Large	Medium to late	May 2	" 24	13	202	12	420	8	368	Round White.
10	Table Talk	Medium	Medium to late	" 2	" 24	11	44	9	84	8	89	Round White.
11	Money Maker	Small	Medium to late	Apr. 30	" 22	11	1,440	10	196	7	1,724	Long White.
12	Everett	Large	Medium to late	May 2	" 24	12	86	11	562	7	1,646	Long Red.
13	Late Puritan	Large	Late	" 2	" 22	16	736	11	308	7	1,104	Long White.
14	Reeves Rose	Medium	Early							*7	767	Long Red.
15	Rochester Rose	Medium	Early							†7	57	Long dark Red.
16	Irish Cobbler	Medium	Medium to early	Apr. 30	" 30	4	1,900	4	52	6	1,286	Round White.
17	Hard to Beat	Small	Medium to late	May 3	" 25	13	334	10	1,384	6	886	Round White.
18	Wee MacGregor	Medium	Medium to late							*5	1,621	Oblong White.
19	Vick Extra Early	Large	Early	Apr. 30	" 9	6	616	5	504	5	1,097	Oblong Pink.
20	Factor	Small	Medium to late	May 3	" 25	7	1,048	4	712	3	1,758	Round White.
21	Arran Chief	Medium	Very late	" 3	" 25	13	1,060	12	156			Oval White.
22	Hood River	Large	Very late	" 3	" 25	14	248	12	1,608			Long Rose.
23	Early Rose	Small	Early	Apr. 30	" 9	6	1,200	5	1,352			Long Rose.

*Average annual yield per acre for 3 years.
†Average annual yield per acre for 4 years.

EXPERIMENTS WITH KINDS OF SET.

Variety experimented with: Gold Coin.

Planted in rows 66 feet long, 30 inches apart, seed planted 12 inches apart in rows. Planted May 1, harvested September 20.

By the table it will be seen that the seed from potatoes having strong buds at seed end only gave the best results in all cases but one, and that the seed, cut to two eyes only, was the best yielder in both the experiments, and required the second smallest amount of seed to be planted.

—	Seeds from potatoes having strong buds from seed end to base.					Seed from potatoes having strong buds near seed end only.				
	Weight of seed planted per acre.	Yield per acre.				Weight of seed planted per acre.	Yield per acre.			
		Marketable.		Not marketable.			Marketable.		Not marketable.	
	lb.	tons.	lb.	tons.	lb.	lb.	tons.	lb.	toas.	lb.
Whole small potato	2221	7	256	.....	1056	2112	10	592	.....	1320
Cut to one eye	858	8	896	.....	1584	1089	10	328	.....	1056
Cut to two eyes	1452	10	1684	.....	1848	1320	10	856	.....	2904
Cut to three or more eyes	1600	9	744	.....	2112	1864	9	1272	.....	2904

HILLED AND LEVEL CULTIVATION.

Variety experimented with: Gold Coin.

Area planted: one-twentieth acre.

Planted in rows, 30 inches apart, sets planted 12 inches apart in the row.

This experiment shows that the better yield was obtained from the potatoes which were hilled after the last cultivation than from the level cultivation.

—	Date Planted.	Date Harvested.	Yield per acre marketable.		Yield per acre, not marketable.	
			Tons.	lb.	Tons.	lb.
Level cultivation	April 30	Sept. 22	11	460	1	980
Hilled after last cultivation	" 30	" 22	12	1360	1	560

COMPARISON OF CROPS FROM FOUR CULTIVATIONS AND EIGHT CULTIVATIONS.

Variety experimented with: Gold Coin.

Area planted: one-twentieth acre.

Planted in rows 30 inches apart, sets planted 1 foot apart in rows.

The potatoes cultivated eight times show that the extra cultivation is beneficial to the crop, the loosening of the soil between the rows causes a better yield to result, and, if not cultivated too deep the last two or three times, will not disturb the growing tubers.

—	Date Planted.	Date Harvested.	Yield per acre marketable.		Yield per acre not marketable.	
			tons.	lb.	tons.	lb.
4 cultivations	April 30	Sept. 22	12	960	1	1300
8 cultivations	April 30	Sept. 22	13	220	1	1200

EXPERIMENT IN DISTANCE OF PLANTING.

Variety experimented with: American Wonder.

Area planted: one-twentieth acre.

Sets used had at least three eyes.

Seed planted in rows 2½ feet apart gives a larger return than that planted in rows three feet apart. Where the sets are only 12 inches apart in the rows the yield is better than where they are 14 inches apart.

—	Sets 12 in. apart.				Sets 14 in. apart.			
	Yield per acre marketable.		Yield per acre unmarketable.		Yield per acre marketable.		Yield per acre unmarketable.	
	Tons.	lb.	Tons.	lb.	Tons.	lb.	Tons.	lb.
Rows 2½ feet apart	12	860	1	1120	10	1940	1	1440
Rows 3 feet apart	9	1560	1	320	9	840	1	500

EXPERIMENT IN PLANTING ON DIFFERENT DATES.

Varieties experimented with: Irish Cobbler (early), Gold Coin (late).

Planted in rows 66 feet long, 30 inches apart. Sets planted 12 inches apart in the rows.

Planted on eight different days, seven days interval between planting.

Harvestings: last five of Irish Cobbler were on September 20.

Harvestings: last five of Irish Cobbler were on August 27.

Harvestings: all eight of Gold Coin were on September 20.

In this experiment it is shown that seed planted in the middle of May gave the best results, both in the case of the early and late variety, that sown on May 15 being far ahead of that sown on any other date; particularly is this to be noticed in the late variety.

EXPERIMENT IN PLANTING ON DIFFERENT DATES.

Date planted.	Irish Cobbler.					Gold Coin.				
	No. of days to mature.	Yield per acre marketable.		Yield per acre unmarketable.		No. of days to mature.	Yield per acre marketable.		Yield per acre unmarketable.	
		tons.	lb.	tons.	lb.		tons.	lb.	tons.	lb.
April 10	139	5	1352	2	224	163	8	896	1	1452
" 17	132	6	408	1	1382	156	9	744	1	640
" 24	125	6	736	1	904	149	9	1008	1	376
May 1	142	6	1992	1	1168	142	9	1536	1	640
" 8	135	8	104	1	376	135	9	480	2	488
" 15	128	8	1952	1	1432	128	12	1608	1	904
" 22	121	5	1880	2	224	121	9	216	2	224
" 29	114	4	448	1	1168	114	5	560	2	1544

Comparison of potatoes cut and coated with gypsum or land plaster, with sets not so coated and planted the same day, also cutting and coating, and not coating the sets two weeks before planting.

Variety experimented with: Gold Coin.

Planted in rows 66 feet long, rows 30 inches apart, sets planted 12 inches apart.

All planted May 8.

All harvested September 21.

By the table below it will seem that coated seed was in both instances superior to uncoated seed in producing a crop, and that the seed cut fourteen days before being planted gave better results than fresh-cut seed both when coated and uncoated.

Coated with plaster.

Fresh cut and planted.				Cut and coated 14 days before planting.			
Yield per acre Marketable.		Yield per acre Unmarketable.		Yield per acre Marketable.		Yield per acre Unmarketable.	
Tons.	lb.	tons.	lb.	tons.	lb.	tons.	lb.
8	104	2	204	10	1,384	2	752

Uncoated.

Fresh cut and planted.				Cut 14 days before planting.			
Yield per acre Marketable.		Yield per acre Unmarketable.		Yield per acre Marketable.		Yield per acre Unmarketable	
tons.	lb.	tons.	lb.	tons.	lb.	tons.	lb.
7	1,312	.....	1,848	9	1,800	.....	1,320

EXPERIMENTS FOR EARLY CROP.

An experiment was made in the planting and growing of potatoes in various ways for early crop.

First: from seed consisting of cut tubers.

Second: from seed consisting of whole tubers, unsprouted.

Third: from seed consisting of whole tubers, sprouted.

Number of varieties, ten; four early, six late.

Drills 30 feet long for each variety, and 30 inches apart.

Sets planted 1 foot apart in drill, thirty of each variety.

Manure in drills at the rate of 16 tons per acre.

All seed planted on March 19, 1915.

Harvested at intervals of two weeks, 10 feet of each variety at each harvesting.

In the following tables: No. 1 represents cut tubers, No. 2 represents whole tubers unsprouted, No. 3, represents whole tubers sprouted.

RESULT of 10 feet harvested.

Test No.	Amount seed planted per 30".		June 25.				July 13.				July 30.				Total weights of crops.			
			Marketable		Not marketable		Marketable		Not marketable		Marketable		Not marketable		Marketable		Not marketable	
	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.
Early St. George																		
1	2·	12·	2·	10·	nil.		7·	.....	.....	8·	5·	4·	nil.		14·	14·	.....	8·
2	7·	12·	12·	10·	.....	8·	13·	.....	.....	8·	12·	8·	1·	8·	38·	2·	2·	8·
3	8·	.....	14·	.....	1·	....	15·	.....	.....	12·	18·	.....	1·	8·	47·	.....	3·	4·
Rochester Rose.																		
1	2·	8·	5·	12·	.....	.....	5·	8·	.....	.....	6·	8·	.....	8·	17·	12·	.....	8·
2	10·	.....	10·	8·	2·	8·	18·	.....	1·	.....	9·	.....	.....	8·	37·	8·	4·	.....
3	9·	8·	16·	12·	.....	8·	18·	8·	1·	8·	19·	.....	2·	.....	54·	4·	4·	.....
American Wonder.																		
1	2·	8·	1·	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1·	.....	.....	.....
2	7·	.....	11·	12·	1·	.....	18·	8·	.....	.....	22·	4·	.....	12·	52·	8·	1·	12·
3	7·	4·	13·	.....	.....	8·	25·	8·	2·	.....	23·	.....	2·	.....	61·	8	3·	8·
Irish Cobbler.																		
1	1·	.....	3·	8·	.....	4·	5·	8·	.....	.....	4·	12·	.....	8·	13·	12·	.....	12·
2	8·	8·	7·	12·	.....	12·	6·	8·	1·	.....	6·	12·	.....	.....	21·	.....	1·	12·
3	7·	12·	9·	12·	.....	4·	7·	8·	.....	.....	10·	.....	.....	8·	27·	4·	.....	12·
Everett.																		
1	2·	8·	1·	8·	1·	.....	4·	8·	.....	.....	4·	8·	.....	.....	10·	8·	1·	.....
2	9·	.....	6·	8·	.....	8·	11·	12·	4·	.....	8·	8·	1·	.....	26·	12·	5·	8·
3	9·	8·	12·	4·	.....	4·	14·	8·	2·	.....	15·	8·	.....	·8	42·	4·	2·	12·
Carman No. 1																		
1	3·	8·	3·	8·	.....	.....	4·	8·	.....	4·	5·	12·	.....	.....	13·	12·	.....	4·
2	8·	.....	12·	8·	.....	8·	16·	10·	.....	4·	8·	.....	.....	.....	37·	2·	.....	12·
3	9·	8·	8·	.....	.....	.....	16·	2·	.....	6·	18·	8·	.....	·8	42·	10·	.....	14·
Dreer Standard.																		
1	3·	.....	3·	4·	1·	.....	4·	8·	.....	8·	12·	.....	.....	.....	19·	12·	1·	8·
2	8·	.....	12·	8·	.....	8·	16·	12·	.....	.....	18·	8·	.....	.....	47·	12·	.....	8·
3	8·	8·	13·	8·	.....	.....	16·	.....	1·	8·	18·	.....	1·	.....	47·	8·	1·	8·
Early Rose.																		
1	2·	12·	4·	.....	.....	8·	8·	4·	1·	.....	1·	8·	.....	.....	13·	12·	1·	8·
2	8·	8·	13·	.....	2·	.....	16·	.....	.....	8·	24·	8·	1·	.....	53·	8·	3·	8·
3	8·	.....	14·	2·	.....	14·	20·	.....	1·	.....	23·	8·	2·	.....	57·	10·	3·	14·
Late Puritan.																		
1	2·	4·	2·	8·	.....	....	3·	8·	.....	8·	2·	8·	1·	.....	8·	8·	1·	8·
2	9·	.....	6·	8·	.....	8·	8·	4·	.....	12·	8·	8·	.....	8·	23·	4·	1·	12·
3	8·	8·	9·	.....	.....	8·	10·	8·	.....	8·	24·	.....	.....	8·	43·	8·	1·	8·
Gold Coin.																		
1	4·	.....	4·	.....	.....	.....	7·	.....	.....	8·	4·	8·	.....	8·	15·	8·	1·	.....
2	9·	.....	9·	8·	.....	8·	17·	8·	.....	12·	8·	8·	.....	.....	35·	8·	1·	4·
3	9·	8·	10·	....	.....	8·	17·	.....	.....	8·	20·	.....	.....	8·	47·	.....	1·	8·

SUMMARY OF RESULTS.

Dates of harvesting.	Weight of crop from cut seed.		Weight of crop from whole unsprouted seed.		Weight of crop from whole sprouted seed.		Total.	
	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.
Four Early Varieties—								
June 25	15	14	43	14	54	10	114	6
July 13	26	4	53	8	61	..	140	12
July 30	18		52	12	70	8	141	4
Totals	60	2	150	2	186	2	396	6
Six Late Varieties—								
June 25	15	12	59	4	65	12	140	12
July 13	24		89	6	99	10	213	
July 30	29	4	74	4	119	..	222	8
Totals	69	..	222	14	284	6	576	4
Early and Late Varieties Combined—								
June 25	31	10	103	2	120	6	255	2
July 13	50	4	142	14	160	10	353	12
July 30	47	4	127	..	189	8	363	12
Totals	129	2	373	..	470	8	972	10

These figures are based on weights of marketable potatoes only.

From the above tables the experiment shows that the sprouted whole seed produced better results than either of the other forms of seed, the unsprouted whole seed being next in order of merit. Both forms of whole seed gave better results than the cut seed. This was more particularly noticeable in the early varieties than in the late ones, and in the early harvesting than in the later ones.

The test from a market gardener's point of view would seem strongly to favour the planting of sprouted whole seed of a desirable variety for early results.

According to the above tables, a much greater quantity of seed was used in planting the whole seed, both sprouted and unsprouted, than in planting the cut seed, and this must be taken into consideration in estimating the relative benefits derived from the above test. In most cases it was three times the weight used in the cut seed test.

AGASSIZ.

PEAS.

Sixteen varieties of peas were tried this year; each variety occupying one row 30 feet long, rows 3½ feet apart. Twelve were sown on March 29; and four, Thomas Laxton, Quite Content, Early Giant, and English Wonder, on April 21. Juno was for the second consecutive season the largest producer and on the three years' average was also the best.

Heroine and Quite Content were tied for second place in this season's results as was Heroine also in the three years' average. Telephone was a good fourth. Gregory Surprise and American Wonder were the first ready for use, June 17, closely followed by Gradus and Sutton Excelsior. Quite Content made a great improvement on last season's showing. it has a very large pod containing large peas of an excellent flavour, and grows to a great height, eight feet or over.

Variety.	Date Sown.	Date ready for use.	Height.	Yield per plot.		3 years' average.	
				lb.	oz.	lb.	oz.
Juno	Mar. 29	July 4	3'0"	30	.....	27	9
Heroine	" 29	July 3	3'6"	28	8	22	13
McLean Advancer	" 29	July 3	3'6"	24	8	22	8
Stratagem	" 29	July 10	2'6"	20	12	19	7
Premium Gem	" 29	June 26	2'0"	25	8	19	5
Telephone	" 29	June 26	6'0"	26	12	18	15
American Wonder	" 29	June 17	1'6"	10	.....	16	8
Gradus	" 29	June 18	4'6"	11	8	14	15
Gregory Surprise	" 29	June 17	3'0"	12	4	14	7
Sutton Excelsior	" 29	June 19	1'6"	13	.....	14	7
Thomas Laxton	April 21	July 3	3'6"	9	8	14	2
The Lincoln	Mar. 29	July 5	3'0"	15	8	11	4
Dainty Duchess	" 29	July 3	7'6"	21	..	20	8
Quite Content	" 29	July 7	8'0"	28	8	.....	
Early Giant	April 21	July 1	3'0"	14	.....	.....	
English Wonder	" 21	July 10	2'6"	16	.....	.....	

ONIONS.

Variety.	Date Sown.	Date Harvested.	Yield per plot 1915.		3 years' average yield.	
			lb.	oz.	lb.	oz.
Salzer Great Red Wethersfield	Mar. 29	Sept. 2	16	.....	12	9
Large Red Wethersfield	" 29	" 2	14	4	12	15
Johnson Dark Red Beauty	" 29	" 2	21	0	.....	
Red Globe	" 29	" 2	21	0	.....	
Danvers Yellow Globe	" 29	" 2	23	0	.....	
Yellow Globe	" 29	" 2	21	0	.....	
White Globe	" 29	" 2	17	0	.....	

Onions.—Of the seven varieties tried this season, all sown on the same date, March 29, Yellow Globe Danvers was the most successful; it is a good onion both for flavour and keeping qualities and suitable to this locality. Red Globe and Red Wethersfield are also good varieties, being uniform in size and shape and good keepers. White Globe is a good onion for pickling. Yellow Globe is early but does not keep well. Each variety occupied one row 60 feet long, the rows being one foot apart.

AGASSIZ.

ONIONS—CULTURE TEST.

An experiment was made this season with four varieties of onions. In one case, the seed was sown outside in the open and in the other the seed was sown in the hotbed and plants were transplanted into the open bed. The results show that the seed sown outside gave a much better yield than that sown in the hotbed and the plants transplanted, the transplanting apparently not suiting the nature of the onions. The dry season may have affected the transplanted onions as there was a lack of moisture for a long time after the transplanting took place. Each variety occupied one row 60 feet long, the rows being 1½ feet apart.

Variety.	Sown Outside.			Sown in Hotbed and Transplanted Outside.		
	Date Sown.	Yield per plot Sept. 11.		Date planted out	Yield per plot Sept. 2.	
		lb.	oz.		lb.	oz.
Large Red Wethersfield	April 21	27	4	May 20	10	8
Giant Prizetaker	" 21	26	8	" 20	9	0
Extra Early Red	" 21	15	0	" 20	8	8
Yellow Globe Danvers	" 21	25	4	" 20	16	0

CORN.

The heaviest yielder of the fifteen varieties of corn planted was Stowell Evergreen. This yielded 98 pounds from the plot or nearly 24 tons per acre. Pocahontas was a good second with 94 pounds from the plot or nearly 23 tons per acre.

Stowell Evergreen, Henderson Metropolitan and Country Gentleman are all good croppers and of good flavour. Golden Bantam is without doubt much the best corn in point of flavour though as its name implies it is of shorter growth than the heavy cropping varieties and the cobs are smaller. Its colour even when unripe is a rich golden yellow. Black Mexican is of good flavour and a fair yielder and being somewhat of a curiosity is popular. Each variety of corn occupied 144 square feet, 12 hills, 3 by 4 feet apart.

Variety.	Date Sown.	Date ready for use.	Yield per plot.		Height.	Yield per acre.		3 years average.	
			lb.	oz.		lb.	oz.	lb.	oz.
Early Evergreen	April 29	Aug. 31	79	0	7′0″	19	236	56	0
Country Gentleman	" 29	" 31	73	0	6′6″	17	1332	58	5
Fordhook Early	" 29	" 23	77	0	4′6″	18	1268	55	0
Perkins Early	" 29	" 28	69	0	6′6″	16	1396	54	2
Henderson Metropolitan	" 29	" 31	57	0	6′0″	13	1588	49	2
Stowell Evergreen	" 29	Sept. 3	98	0	7′6″	23	1432	49	13
Black Mexican	" 29	Aug. 31	61	4	7′6″	14	1643	46	2
Extra Early Adams	" 29	" 11	32	8	2′6″	7	1730	41	0
Golden Bantam	" 29	" 28	51	0	4′0″	12	684	35	5
Early Malcolm	" 29	" 21	32	0	2′0″	7	1488	31	8
Early Iowa	" 29	" 22	32	0	2′0″	7	1488	27	8
Pocahontas	" 29	" 31	94	0	6′6″	22	1496	72	0
White Squaw	" 29	" 17	54	0	4′6″	13	136	45	0
Early Dawn	" 29	" 24	32	8	3′0″	7	1730	24	2
Red Squaw	" 29	" 25	24	0	2′0″		5616		.....

TOMATOES

Twelve varieties were grown this season. These were all sown in the hotbed on March 18, with the exception of one variety which was sown on March 24. From the hotbed they were transplanted to pots and from these to the open about the second week in May.

Victoria Whole Salad is without exception the best all round variety tried. Its shape and flavour leaves nothing to be improved on and further it is a heavy cropper. It is also earlier to ripen than any other variety and is not so subject to rot in wet weather as so many other varieties are.

Sunnybrook Earliana, Florida Special, Chalk Early Jewel and Prosperity have no results recorded for this year as the labels in the hotbed got mixed and it was impossible to separate these varieties. These four varieties are very suitable to the locality and of good quality.

In computing the weights of the tomato crop the green as well as the ripened fruit is taken account of as there is a good demand for it for preserves, pickles, etc. Also it is not every year in this locality that all tomatoes ripen. The tomato crop this year ripened exceedingly well and the percentage of green fruit left at the end of the season was small. The rot which was troublesome last season was practically nil this year.

Variety.	Date Sown.	Date ready for use.	Yield from five average plants.		Yield per acre.		Annual average for 3 years.	
			lb.	oz.	tons.	lb.	lb.	oz.
Bonny Best	Mar. 18	Aug. 2	83	8	22	465	43	6
I. X. L. Extremely Early	" 18	" 2	78	.....	21	471	43	1
Rennie XXX Earliest	" 18	" 2	71	4	19	795	42	8
Alacrity	" 18	" 2	53	8	14	1130	39	7
North Adirondack Earliana	" 18	" 2	64	4	17	984	39	4
Victoria Whole Salad	" 18	July 22	71	8	19	931	[1]64	5
Johnson Jack Rose	" 18	Aug. 6	70	4	19	251	[1]55	
Scarlet Dewdrop	" 24	" 13	77	8	21	198	.....	
Sparks Sunnybrook Earliana	" 18	.....	.....	.....	.....	.....	32	14
Florida Special	" 18	.....	.....	.....	.....	.....	30	4
Chalk Early Jewel	" 18	.....	.....	.....	.....	.....	33	11
Prosperity	" 18	.....	.....	.....	.....	.....	35	6

BEETS.

Cardinal Globe was for the second season the best beet grown both for quality and yield though so far as yield was concerned Early Model was nearly as good. Early Model attains a large size and keeps its shape well. New Early Black Red Ball is the best beet for flavour and colour but its yield is comparatively small. Eclipse was first in the three-year average and is a heavy cropper but is coarse and stringy. Each variety of beet occupied one row 30 feet in length, the rows being 1½ feet apart.

Variety.	Date Sown.	Date ready for use.	Yield per plot.		Yield per acre.		Annual average yield per plot for 3 years.	
			lb.	oz.	tons.	lb.	lb.	oz.
Cardinal Globe	May 4	July 16	64	12	18	19	[1]48	4
Meteor	" 4	" 8	39	..	11	659	48	13
Ruby Dulcet	" 4	" 21	47	8	13	1597	47	13
New Early Black Red Ball	" 4	" 7	12	8	3	1262	31	5
Eclipse	" 4	" 16	21	8	6	491	54	4
Crosby Egyptian	" 4	" 21	54	....	15	1374		
Early Model	"	June 30	64	...	18	1184		

[1]Annual average yield for two years only.

AGASSIZ.

CARROTS.

The carrots tested this season were sown later than last but were ready for use some time earlier. The best results were obtained from Half Long Chantenay with 107½ pounds. Improved Half Long Danvers came second with 95½ pounds. Half Long Chantenay and Nantes are both good table carrots. Early Scarlet Horn is the best for early use, is nicely shaped and a fair cropper. Late Chantenay has a good flavour.

Variety.	Date Sown.	Date ready for use.	Yield per 30-foot row.		Average annual yield for 3 years.	
			lb.	oz.	lb.	oz.
Half Long Chantenay	April 24	June 24	107	8	68	3
Improved Half Long Scarlet Nantes	Mar. 29	July 7	67	8	60	
Early Scarlet Horn	April 21	June 6	39	0	.....	
Improved Half Long Danvers	Mar. 29	" 6	95	8	.....	
Late Chantenay	May 5	July 4	41	0	.....	

BEANS.

Of the nine varieties of beans tested this year Refugee or 1,000 to 1 gave the largest yield—27¾ pounds to 30 feet of row. Bountiful Green Bush and Grenuell Rustless Wax were also good croppers. On the three-year average, Refugee or 1,000 to 1 is an easy leader.

The returns might have been greater had it not been for a spell of very hot weather during the picking season which exposed the roots to the heat of the sun.

Variety.	Date Sown.	Date ready for use.	Yield per plot. 1 row—30 ft. long.		Average annual yield per plot for 3 years.	
			lb.	oz.	lb.	oz.
Refugee or 1000 to 1	May 4	July 12	27	12	24	10
Bountiful Green Bush	" 4	" 10	18	4	20	12
Extra Early Refugee	" 4	" 12	12	4	20	1
Wardwell Kidney Wax	" 4	" 12	12	.....	18	8
Burpee New White Seeded Green Pod	" 4	" 12	13	.....	18	
Valentine Wax	" 4	" 12	8	.....	15	13
Grennell Rustless Wax	" 4	" 13	13	12	16	
Extra Early Valentine	" 4	" 7	11	4	.....	
Stringless Green Pod	" 4	" 12	13	8	.....	

LETTUCE.

Six varieties of lettuce were grown this season. They were all sown on the same day and all matured within a few days of each other with the exception of Giant Crystal Head which matured as early as June 6.

Giant Crystal Head is an excellent lettuce. Its heads averaged 10 ounces each and some weighed as much as 20 ounces. Iceberg is a similar lettuce that can be well recommended and is a most useful variety. Grand Rapids is good for either early

or late sowings. The other varieties went to seed more or less before reaching maturity which accounts at least in part for the decrease in their weights. Each variety of lettuce occupied one row 30 feet long, 60 plants being grown. The rows were a foot apart.

Variety.	Date sown.	Date harvested.	Yield per plot.		Annual average Yield per plot for 3 years.	
			lb.	oz.	lb.	oz.
Giant Crystal Head	Mar. 29	June 6	49	.....	40	13
Iceberg	" 29	July 8	39	12	33	14
Grand Rapids Forcing	" 29	" 3	29	12	31	14
Improved Hanson	" 29	" 12	15	4	23	8
Dreer All Heart	" 29	" 12	6	12	9	4
May Queen	" 29	June 29	2	.....	.....	

Turnips.—Swede for Table use.

Owing to the prevalence of cabbage maggot which is particularly destructive to that kind, no white turnips were sown.

The best yielders among the ten varieties of swedes grown was Brydon Darlington which gave 95 pounds from 30 feet of row. It is also an extra early kind. All varieties did fairly well considering the dry season. An attack of lice lasting from August 29 to September 13 checked them somewhat, but from this time on they made rapid growth until October 4, when they were harvested.

Variety.	Date sown.	Ready for use.	Yield per 30 feet of row.	
			lb.	oz.
Brydon Darlington	May 11	Aug. 12	95	
Hall Purple Top	" 11	" 12	90	
Skirving Purple Top	" 11	" 12	74	
Bangholme Purple Top	" 11	" 12	72	
Best of All	" 11	" 12	72	
Westbury Purple Top	" 11	" 12	70	
Sutton Purple Top Champion	" 11	" 12	64	
Carter Invicta	" 11	" 12	61	
Brydon Monarch	" 11	" 12	52	
D & F Favourite	" 11	Sept. 1	44	

PARSNIPS.

Improved Hollow Crown was the better of the two varieties grown this season though the crop was not so large as it would have been had the season not been so dry. Both varieties were of good quality.

Variety.	Date sown.	Date ready for use.	Yield from 30 feet of row.		Annual average yield of 30-feet of row for 3 yrs.	
			lb.	oz.	lb.	oz.
Improved Hollow Crown	Mar. 29	Oct. 1	52	.....	61	
Intermediate	" 29	" 1	43	8	.....	

Agassiz.

PARSLEY.

Double Curled was the only variety tried this season. This is a good sort with dark green curled leaves. It was sown on April 29 and was ready for use July 20. The crop was excellent.

SALSIFY.

Long White was the only variety tried. It was not, however, very satisfactory. It was sown March 29 and ready for use about the beginning of September. The average crop for two years from 30 feet of row was 23 pounds.

SQUASH AND MARROWS.

Long White Marrow was the heaviest yielder of the marrows tried. There were 267 pounds harvested from three hills. This and the bush variety of the same marrow are the best for table and market purposes. The latter leads all in the three years' average. Custard Scallop is more of a curiosity than a useful vegetable as from its extraordinary shape when the rind is removed there remains very little edible matter. This remark applies also to the Summer Crookneck. Of the remaining varieties Golden Hubbard is best in flavour, shape and keeping qualities.

Variety.	Date sown.	Date ready for use.	Yield from 3 hills.		Annual average yield from 3 hills for 3 years.	
			lb.	oz.	lb.	oz.
Long White Bush Marrow	April 26	July 15	105	8	[1]173	14
Custard White Bush Scalloped	" 26	" 23	90	.....	101	
Delicata	" 26	Aug. 18	163	8	[1]141	12
Summer Crookneck	" 26	July 13	51	.....	68	6
Golden Hubbard	" 26	" 15	175	8	[1]123	13
Delicious	" 26	" 13	76	.....	197	6
Long White Marrow	" 26	" 7	267	.....	.....	

[1]Average for two years only.

CUCUMBERS.

Seven varieties of cucumbers were planted in rows 7 feet apart, plants 3 feet apart in the rows. The weights were taken from seven plants of each variety.

Fordhook Famous was an extra good yielder and of a very nice flavour. Davis Perfection is a well shaped variety and has a nice smooth skin. Cool and Crisp failed to germinate at the first sowing and only two plants resulted at the second. The varieties tested are all worthy of a place in the market garden.

Variety.	Date sown.	Date ready for use.	Yield per plot.	
			lb.	oz.
Cool and Crisp	May 4	Aug. 12	‡17	4
Improved White Spine	" 4	July 21	115	12
Giant Pera	" 4	" 21	99	4
Extra Early Russian	" 4	" 21	65	12
Prize Pickle	" 4	" 21	65	8
Fordhook Famous	" 4	" 21	156	8
Davis Perfection	" 4	" 21	102	

‡Only 2 plants yield.

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PUMPKINS.

Large Field and Sweet as Sugar varieties are similar except that the fruit of the former is larger averaging 18 to 20 pounds each as against 5 to 7 pounds each in Sweet as Sugar. Jumbo is a good yielder but rather coarser than the first two mentioned varieties. The three varieties tested matured within a few days of each other.

Variety.	Date sown.	Date ready for use.	Yield from 3 hills harvested Oct. 10.
			lb.
Large Field	May 6	Aug. 21	273
Sweet as Sugar	" 6	" 26	114
Jumbo	" 6	" 26	203

CELERY.

Celery did not do well this season largely because it was set out as a drought was commencing. It was transplanted about June 30. The best winter keepers were Evans Triumph and French Success. Giant Pascal and Improved White Plume are also good varieties. They both yielded well and have good flavour and quality. Burpee Fordhook did not germinate. It was sown too late in the season.

Variety.	Date sown.	Date planted out.	Date ready for use.	Weight of 30 plants harvested October 13.	
				lb.	oz.
Giant Pascal	Mar. 18	June 17	Sept. 9	20	
Paris Golden Yellow	" 18	" 17	" 9	16	
French Success	" 18	" 17	" 9	8	8
Noll Magnificent	" 18	" 17	" 9	18	
Evans Triumph	" 18	" 17	" 9	22	
Improved White Plume	" 18	" 17	" 9	22	
White Plume	" 18	" 17	" 9	14	8
Burpee Fordhook	April 20		Did not germinate.		

CABBAGE.

Although this has been an exceptionally dry season it has been a good one for cabbage. Large crops of a good quality were grown. We had no trouble with the Cabbage Maggot and the aphids came late, and though they were infected with them, the cabbage took no harm. The majority of the early cabbages were very healthy and roots were left in the ground after cutting the cabbage, with the result that they sprouted out nicely and some very nice small heads were cut as second crop in October. The early varieties did very well. Nofalt was best of the late varieties. Fottler Improved Brunswick was an excellent variety both in yield and flavour. On the three

year average Flat Swedish was the largest producer with Extra Amager Danish Roundhead a good second.

Variety.	Date sown.	Date ready for use.	Yield per 10 heads.		Annual average yield from 10 heads for 2 years	
			lb.	oz.	lb.	oz.
Flat Swedish	April 6	July 31	58	12	69	14
Extra Amager Danish Roundhead	" 22	Aug. 18	59	12	67	6
Danish Summer Ballhead	" 6	" 15	51	12	52	12
Early Paris Market	" 6	July 21	16	4	32	14
Early Jersey Wakefield	" 6	" 24	19	2	.....	
Fottler Improved Brunswick	" 6	Aug. 18	61	12	.....	
Nofalt	" 6	July 31	41	12	.....	
Copenhagen Market	" 22	Failure.				
Improved Amager Danish Roundhead	" 6	Aug. 15	Failure.			

SMALL FRUITS

Raspberries.—The best variety was the Cuthbert; it produced a good crop of firm, medium-sized, well-shaped berries. It should be a good commercial variety as it has a good flavour and excellent shipping qualities. It fruited from June 15 to July 16 and was earlier this year than usual. Superlative was a good second. The remaining varieties, White Queen and Fillbasket were not of much account either in amount of crop or quality.

Blackberries.—Snyder and Erie were the most successful blackberries and seemed to be able to throw off the attacks of the leaf-hopper and leaf-spot which affected the other varieties severely. Snyder produced well and fruited from July 12 to July 31. Erie produced a larger crop than Snyder and fruited from July 12 to August 2.

Black Currants.—Boskoop Giant was the best variety, with Victoria second. The crop was small this year as the bushes were only starting to yield.

Loganberries.—Like the early blackberries the Loganberries were attacked by leaf-hoppers and leaf-spot just as the fruit was ripening, spoiling what promised to be a fairly good crop.

AGASSIZ.

FLOWERS.

List of Best Annuals.

Variety.	Began to bloom.	Bloom over.	Height.	Remarks.
			Inches.	
Alyssum, Little Dorrit, white	June 26	Aug. 27	10	Good.
" Little Gem, white	" 22	Oct. 30	18	Very good.
Leptosiphon hybrids, mixed	" 19	Sept. 29	6	"
Brachycome iberidifolia, blue	July 16	Oct. 6	18	"
Mignonette, sweet scented	June 16	" 6	12	Good.
Eschscholtzia, Californian mixed	" 14	" 16	30	"
Calendula officinalis	" 22	Sept. 22	24	Fair.
Linum grandiflorum	" 23	" 27	18	Good.
Acroclinium grandiflorum	" 18	Oct. 3	36	Very good.
Centranthus macrosiphon	" 27	Sept. 30	30	"
Godetia—Bridesmaid, Duchess of Albany, Apple Blossom, Double Rose				All very good.
Sweet Sultan, mixed	" 28	" 30	30	Very good.
Jacobaea, mixed				"
Amaranthus tricolor				Foliage very fine.
Gypsophila elegans	June 15	Sept. 16	18	Very good.
Balsam, mixed colours	" 27	Oct. 3	12	"
Browallia elata	" 24	Sept. 27	24	Good.
Chrysanthemum, Northern Star	July 10	Oct. 13	30	Very good.
Rudbeckia, Golden Sunset	" 11	Nov. 3	42	"
Nigella, Miss Jekyll	Aug. 7	Oct. 10	24	Good.
Clarkia elegans	June 29	Aug. 15	24	Very good.
Poppy, Shirley	" 15	July 30	5 ft.	Very good.
Cornflower, mixed	" 18	Sept. 30	4½ ft.	"
Larkspur—in varieties—Blue, Rosy, Scarlet and White.				All very good.
Coreopsis, mixed	July 1	Aug. 30	30	Very good for cutting.
Lupines, mixed	June 24	Sept. 6	30	"
Marigold, French	July 7	Oct. 3	2½ ft.	Very good for cutting.
Zinnia, mixed	June 11	Oct. 4	3 ft.	Very good.
Ageratum, blue	July 16	" 3	18 in.	Very goodblue
Dianthus				Did extra well
Petunia, mixed	July 18	Sept. 10	2 ft.	Very good.
Lobelia, blue	June 14	" 11	4 in.	Good for edging.

All the above annuals did very well in spite of the dry weather and can be recommended to be grown as such for cutting and show purposes and for display in the garden.

Nasturtiums.—Both tall and dwarf varieties are exceedingly good. Phlox Drummondii did very well and bloomed until frost came in late December.

ORNAMENTAL TREES AND SHRUBS.

All the flowering shrubs and evergreens did very well this year. The former bloomed well and early and both made good growth, as did also the ornamental hedges. The Rhododendrons, after flowering profusely, made good growth and budded well for the following season, some varieties even blooming again in December. It is to be regretted that owing to the very severe weather snow and wind storms being exceptionally bad in the months of January and February of 1916 almost all of the Rhododendrons and Standard Hollies suffered most severely. The mildness of the

early part of the winter in which their growth was unchecked no doubt made them more susceptible to the wind and the frost. The tender Hydrangeas, however, had been carefully protected with straw and sacking and came through the severe weather unscathed. The hemlock hedge was badly damaged by the storms and weight of snow which drifted into it. A few of the ornamental trees lost a few branches during the storm and one white pine was badly damaged, losing most of its top. Most of the trees lost a great number of twigs and small shoots due to the storms. All of the roses seem to have weathered the severe winter successfully and promise well for next season.

FLOWER SEED.

Flower seed saved on the Experimental Farm in 1914 and sown in 1915:—

Leptosiphon hybrids,—Did very well and proved to be equal to Suttons.

Candytuft, mixed,—There were no other varieties for comparison but they did very well.

Mignonette,—Seemed to be rather small in bloom.

Eschscholtzia (Californian).—Grew well but had few blooms.

Gadetia, Apple Blossom, Double Rose, Scarlet Queen,—All did exceedingly well. Apple Blossom and Scarlet Queen were slightly mixed.

Bartonia, aurea.—Failure.

Clarkia, mixed.—Were equal to Sutton's Brilliant.

During the fall of 1914 seed from several of the flowers was saved and was sown this season with, on the whole, satisfactory results. Many of the varieties compared very favourably with those grown from the imported seed and there were only two, *Lychnis (Viscaria) cardinalis* and *Bartonia* which were a failure. Provided the harvesting season is favourable there seems to be no reason why home-grown seeds should not be as good producers as those obtained elsewhere.

AGASSIZ.

EXPERIMENTAL STATION FOR VANCOUVER ISLAND, SIDNEY, B.C.

REPORT OF THE SUPERINTENDENT, LIONEL STEVENSON, B.S.A., M.S.

CHARACTER OF THE SEASON.

The winter of 1915 was exceptionally mild and dry, the spring remarkably early and warm, while the summer was one of the driest on record. The autumn was open and free from frost and snow, heavy rains set in during October and continued until late December. The precipitation during the summer months was not sufficient for the best development of plant life. The climatic conditions during January and February of 1916 were very severe on all plant life, and some tender foreign plants were killed by low temperatures. All foreign plants that survived, we now know to be hardy to twenty degrees of frost.

ORCHARDS.

Growth of the Orchard.—The trees planted late in the spring of 1914, survived the summer, became well rooted and in good condition generally to start 1915. The growth made during the past season has been remarkable for large and healthy wood development. Some varieties of plums made a growth of 6 feet, while pears both dwarf and standard made growth of from 2 to 4 feet. Medlars, quinces, apricots, almonds and nectarines all made growth of 3 to 4 feet. Sweet and sour cherries in variety and apples in variety did well with but few exceptions, nearly all varieties making growth of from 2 to 5 feet.

Number of varieties of apples established in orchard					30
"	"	sweet cherries established in orchard			41
"	"	sour cherries	"	"	16
"	"	standard pears	"	"	50
"	"	dwarf pears	"	"	36
"	"	plums	"	"	36
"	"	peaches	"	"	6
"	"	quince	"	"	8
"	"	medlar	"	"	3
"	"	apricot	"	"	14
"	"	pomegranate	"	"	3
"	"	nectarine	"	"	4
"	"	almond	"	"	11
"	"	citrus	"	"	17
"	"	figs	"	"	24

Orchard tillage.—The entire orchard area was tilled with a Kimball cultivator from early spring until September. On September 2 the areas between trees were seeded with rye and vetch. This crop made excellent growth through the autumn. It will be turned under in May.

New Plantations during Season 1915.—A fig orchard of the following varieties was set: Agen, Angelique, Adriatic, Brown Turkey, Black Ischia, Brunswick, Col. di Signora Nigra, Celeste, Doree, Dauphine, Drap d'Or, Ladaro, Mission, Ronde Noire, Pastiliere, Royal Vineyard, Ronde Violette Hative, Smyrna, San Pedro White, Warren Brown Turkey, Wilson Smyrna, White Ischia, White Genoa.

Grapes.—A vineyard of the following varieties was set: Buckland Sweetwater, Black Hamburgh, Brant, Chasselas de Fontainebleau, Gros Colman, Lindley, Peabody, Brighton, Canada, Campbell Early, Delaware, Dattur de Beyreuth, Foster Seedling, Hartford, Trentham Black, Winchell, Vergennes, Moore Early, Foster Seedling.

Sweet Cherries.—This plantation was established in 1914 with 41 varieties, the majority of which were secured from Baltet Nursery Co., France. Most of the trees made excellent growth during the 1915 season, several varieties making from 50 inches to 72 inches growth. A number of varieties made less than 18 inches of growth, seemed tender to spray materials and subject to aphis injury, named as follows: Abbesse d'Oignies, Belle de Choisy, De Mezel, d'Annonay, Empress Eugenie, Emperor Francois, Gros Rouge, Gros Noir, Jaune de Buttner, May Duke, Pleureur, Reverchon. Black Aphis gave considerable trouble during the entire season on both sweet and sour cherries.

Sour Cherries.—Of the sixteen varieties planted in 1914, a large percentage made very satisfactory growth, sixty inches being the maximum attained by any variety. Those varieties that made a weak growth or died are listed as follows: Anglaise Tardive, Belle de Franconville, De Sauvigny, De Vaux, Griotte du Nord, Lemercier and Nouvelle Royale. The Montmorency proved more attractive to the aphis and their attendants than did any of the other varieties of sour cherries.

Medlars.—The four varieties of medlars planted in 1914 all made growths varying from 32 to 48 inches. The variety De Hollande proved the most vigorous grower.

Nectarines.—This plantation was established in 1914 with three varieties, and a fourth variety, the Early Violet, was added in 1915. The trees planted in 1914 made during the season from 54 to 75 inches of growth. The Boston, Lord Napier and the Stanwick varieties proved very susceptible to leaf curl.

Peaches.—This plantation was established in 1914 and made from 45 to 60 inches growth during 1915. Two varieties Alexander and Triumph proved more subject to leaf curl than the other varieties.

Plums.—Of the thirty-six varieties planted in the orchard during 1914, all but three made excellent growth, the maximum for any variety being 102 inches. The three varieties that did not make satisfactory growth are listed as follows: Ebersweier, Formosa and Gaviotta.

Prunes.—Of the three varieties of prunes established in 1914, all made satisfactory and uniform growth, the maximum growth for the Italian prune being 60 inches.

Pears.—The plantation of standard pears established during 1914 with fifty varieties, French and Canadian grown stock, made very satisfactory growth during the season of 1915. Many varieties bloomed, but were not permitted to fruit. All varieties were free from disease and very little aphis injury was recorded.

The following varieties proved the most vigorous and made more than 20 inches growth: Bose, Bartlett, Kieffer, Louise Bonne, Souvenir de Congrès and Williams (Bartlett).

The following varieties made unsatisfactory growth: Marguerite Marillat and Royale Vendée.

Dwarf Pears.—The plantation of dwarf pears established during 1914 with thirty varieties, secured from Baltet Nurseries, France, all made satisfactory growth. Thirteen inches was the smallest amount of growth recorded, while several varieties made more than forty inches. Several varieties blighted but only one variety, the Doyenne d'Hiver, was attacked by aphis.

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Quinces.—The following varieties were added to the quince plantation during the year: Champion, Comina, Orange and De Portugal. The growth made during the season of 1915 by the French varieties of quinces that were planted during the spring of 1914 was remarkable. One variety, the De Bourgeaut, made a growth of 66 inches. All varieties with but one exception made a growth of 30 inches or more.

Apples.—This plantation was established in 1914 with 27 varieties of Standard apples and 3 varieties of crabs. The majority of the red fruit varieties made satisfactory and strong growth. The following varieties proved the most vigorous and resisted disease and insect injury: Delicious, Gravenstein, Grimes Golden, King David, King of Tompkins County, Lowland Raspberry, Monsieur Gladstone, McIntosh Red, Rome Beauty, Sweet Bough, Trenton, Transcendent, Wagener, and Winter Banana.

The following did not make as satisfactory progress: Cox Orange Pippin, Duchess of Oldenburg, Jonathan, Melba, Red Astrachan, Wealthy, and Yellow Transparent.

All varieties of crab-apples made excellent growth. The following additions were made to the apple orchard during 1915: Alexander, Blenheim Orange, Peasgood Nonsuch, Ribston Pippin and Spitzenberg.

Apricots.—This plantation was established in 1914 with 14 standard American and French varieties. The following additions were made during 1915: De Boulbon, Moorpark and Royal.

The growth of all apricot varieties was strong, the majority of the varieties making from 36 inches to 60 inches of growth. One French variety, the Magyar Legjob, made a growth of 72 inches.

Almonds.—The following varieties of almonds were secured from California and from France, and planted during the year: Hardshell, I.X.L., Jordan, King, Languedoc, Lewellyn, Ne Plus Ultra, Nonpareil, Paper Shell, Texas Prolific. All varieties did well and made a season's growth varying from 18 to 48 inches.

Experimental Nut Orchard.—The beginning of an experimental nut orchard was made in the planting of the following varieties of nut trees.

Grafted Walnuts: Juglans à Coque tendre, Fertile, Bijou a gros Fruit, Ordinaire, Mayette Rouge, Franquette on California Black, Franquette Vroomans, Mayette, De la St. Jean.

Grafted Chestnuts: *Castanea vulgaris,* Coubale, de Lyon, Ridgely, Rochester, Spanish.

Grafted Pecans: Pabst, Stuart, Van Deman.

Seedling Pecans: Mission, Illinois.

Hickory: Shellbark, Missouri Mammoth.

Filberts, *Corylus macrocarpa*: Fertile de Coutard, d'Angleterre, de Provence, Merveille de Bollwiller, Nottingham, Fertile, Emperor, A feuille pourpre, A feuille laciniae, Pellicule rouge, Gosford, Prolifie, du Béarn, Commun, Calyculata, Avellana, Colurna, Macrocarpa, English Filbert,, du Chilly, Red Hazel, Barcelona, Kentish Cob, Purple Californian, Purple Spanish.

The Citrus Plantation.—The oranges, grape fruit and Limequat all made good growth during the summer. Three varieties of Satsuma oranges—Natsu-mikan, Unshiu and the Media Acida—blossomed, set and developed fruit which did not ripen, owing to unusual weather conditions during January. The following varieties were planted during 1915: Savage Seedling, Norton, Saunders Seedling, Cunningham, Colemans, Rusk Seedling, Sampson Tangelo, Limequat, Willets Seedling, Natsu-mikan, Media Acida.

All varieties suffered from the unusual weather; the tri-foliate varieties will make quick recovery as they were less injured than the other types.

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MISCELLANEOUS PLANTATIONS.

Holly Plantation.—An experimental holly orchard was set during 1914, the object being to determine the relative values of grafted stock and seedling stock, also to obtain data on costs of production, results from various cultural methods and systems of pruning.

Name.	Planted.	Stock.	No. of Trees.	No. bearing Fruit.	Weight of Crop.
Ilex Aquifolium	1914	Grafted.	53	51	8 lb.
" "	1914	Seedlings.	47	11	Nil.

Lavender Plantation.—One-year seedling plants of *Lavendula vera* were set in 1913, and made 3 inches of growth that season and flowered between June 14 and August 18. During 1914 these plants made a growth of 4 inches and flowered from July 2 to October 21, producing 72 bunches. During 1915 the plants became more dense and made a growth of 8 inches, bloomed from June 12 to December, and produced 420 bunches of bloom. Number of plants 102, number of stalks of bloom per bunch 25 to 30, twenty bunches per pound.

Medicinal Plants.—A plantation of *Rhamnus Purshiana*—Cascara, was set in 1914, of two and three-year-old seedling trees collected in forest. Season's growth: 1914, 12 inches; 1915, 70 inches.

Tree and shrub types are all healthy and making splendid growth under cultivation.

Pomegranates.—The following varieties of pomegranates were secured from the California nursery and set.

Name.	Season's Growth.
Mme. Legrelle	6 inches medium.
Double White	16 " strong.
Double Scarlet	5 " medium.

The following varieties of persimmons, were secured from the United States Bureau of Plant Industry:—

Persimmon (*Diospyros*).—Early Golden, Hicks, Ida, Ruby, Glenwood, Kawakami, Marion, Delmas, Josephine, Silky Fine.

The following varieties of Persimmons suffered from frost injury: Ida, Ruby, Silky Fine and Hicks.

Economic plants.—A plantation made up of the following economic plants was set: *Broussonetia papyrifera, Broussonetia Kajinoki, Camellia theifera* (Japanese tea). *Camellia theifera variegata, Cinnamomum Camphora, Eriobotrya japonica Tanaka, Eriobotrya japonica (Loquat.), Elaeagnus pungens, Elaeagnus umbellata, Elaeagnus longipes, Edgeworthia papyrifera, Rhus vernicifera, Rhus succedana.*

All the above varieties grew well during the season. The *Elaeagnus pungens* fruited.

The following suffered from frost injury during the cold period of January when subjected to 20 degrees of frost: *Camellia theifera, Camellia theifera variegata, Cinnamomum Camphora, Broussonetia papyifera and Broussonetia* Kajinoki.

SIDNEY.

SMALL FRUITS.

The small fruits plantation was established April 30, 1913, on heavy black loam soil containing a large percentage of clay.

Name of Variety.	Date of first picking.	Date of last picking.	Size of fruit.	Yield per acre Season 1915. lb.	ozs.
Red Raspberries—					
Cuthbert	June 9	Oct. 30	Medium	2,583	4
Fillbasket	" 10	July 9	Large	1,537	6
Superlative	" 10	" 9	Medium	693	2
Golden Queen	" 10	Oct. 16	Medium	3,755	4
Blackberries.					
Erie	July 17	Sept. 11	Large	6,225	2
Snyder	" 17	Aug. 14	Medium	2,595	14
Phenomenal	Blighted				
Mammoth	Blighted				
	First ripe fruit.		Size of fruit.	Yield 1915.	
Black Currants.					
Topsy	May 29		Large	2,510	4
Eagle	June 2		Medium	2,964	8
Victoria	" 5		Large	2,117	8
Boskoop Giant	" 1		Medium	4,719	..
Eclipse	" 26		Large	1,996	8
Magnus	" 1		Medium	3,448	8
Climax	" 1		"	4,477	..
Kerry	" 2		"	5,384	8
Clipper	" 2		"	1,936	..
Buddenborg	" 23		Large	3,993	..
Saunders	May 27		Medium	4,356	..
Collins Prolific	June 3		Large	2,268	12

Planted April 30, 1913.

Red Currants.					
Greenfield	May 28		Medium	1,996	8
Grape	June 1		Small	3,478	12
Cherry	May 28		Medium	998	4
Perfection Red	" 28		Large	3,040	2
Admirable	" 28		Large	544	8
Victoria	" 20		Medium	3,267	..
Red Cross	" 28		Medium	4,840	..
Cumberland	" 29		Small	2,843	8
Red Dutch	" 20		Small	816	12
Rankins Red	" 20		Small	1,817	..
Wilder	" 30		Medium	2,208	4

Planted April 30, 1913.

White Currants.					
White Cherry	June 8		Medium	1,663	12
Large White	" 12		Small	1,936	..
White Grape	" 3		Large	1,694	..

Planted April 30, 1913.

Gooseberries.	Mildew.	Ripe.	Size.	Yield per acre,	
Industry	No	June 18	Large	1,815	..
Champion	No	" 26	Medium	3,388	..
Victoria	No	" 18	Large	1,936	..
Houghton	No	" 18	Small	1,573	..
Whitesmith	Yes	" 19	Medium	786	..
Red Jacket	No				

Set April 30, 1913.

Strawberries.	Ripe.	Size.		Yi eld per acre,	
Sharpless		June 5	Medium	1,272	14
Paxton		" 5	Large	8,250	..
Magoon		" 29	Large	5,327	2

The following varieties were set in experimental blocks during October, 1915: Julia, Virgilia, Cassandra, Mariana, Desdemona, Valeria, Cordelia, Portia, Splendid, Senator Dunlap, Warfield No. 2, Royal Sovereign and Triomphe de Ghent.

SIDNEY.

VEGETABLES.

RESULTS OF VARIETY TESTS AND CULTURAL EXPERIMENTS WITH GARDEN VEGETABLES FOR SEASON 1915.

Rhubarb.

The following varieties of rhubarb have been established: Hobday Giant, Monarque, Prima Donna, Linnaeus and Early Raspberry.

Garden Peas.—Comparison of Early *versus* Late Sowing.

Variety.	Date of seeding.	Length of row.	Ready for use.	Height.		Yield.	
				Feet.	Inches.	Lb.	oz.
Quite Content	March 9	30	July 2	6		42	8
Telephone	" 9	30	June 26	6	9	43	4
Heroine	" 9	30	" 26	4	6	47	..
Quite Content	April 9	30	July 16	6	..	16	8
Telephone	" 9	30	" 9	6	..	19	10
Heroine	" 9	30	" 9	4	9	23	10

From the above table it can be seen that the March 9 sowings gave more than double the yield of the sowings of April 9. The height of the plants of the April 9 sowings was nearly the same in each variety as with the March 9 sowings. The plants were as vigorous, but the moisture had gone from the soil.

Variety Test.

Variety.	Date of seeding.	Length of rows.	Ready for use.	Height.		Green yield from one 30 foot row.		Yield ripe seed one 30 foot. row	
		Feet.		Ft.	Ins.	Lb.	oz.	lb.	oz.
Quite Content	April 9	30	July 16	6	..	16	8	3	2
Telephone	" 9	30	" 9	6	..	19	10	4	12
Heroine	" 9	30	" 9	4	9	23	10	5	2
Advancer	" 9	30	" 9	4	..	29		4	15
Dainty Duchess	" 9	30	" 9	6	..	25	12	5	2
Sutton Excelsior	" 9	30	" 2	2	6	17	2	3	7
Gradus	" 9	30	" 2	6	..	18	2	2	10
Gregory Surprise	" 9	30	" 26	4	9	16	..	2	12
Stratagem	" 9	30	July 9	3	6	22	14	2	13
Juno	" 9	30	" 9	3	6	23	9	5	3
Lincoln	" 9	30	" 9	3	6	21	2	3	10
Premium Gem	" 9	30	" 9	2	6	17		3	2
American Wonder	" 9	30	June 26	1	6	13	10	3	4
English Wonder	" 9	30	" 26	1	6	10	9	1	7

From the foregoing table it will be noted that for the production of green peas the following six varieties lead: Advancer, Dainty Duchess, Heroine, Telephone, Juno, and Stratagem. These same varieties all proved to be heavy yielders of ripe seed, a factor of importance to intending seed growers.

Sidney.

Corn.—Variety Test.

Variety.	Date of planting.	Length of row.	Ready for use.	Height.	Yield.	Green ears.
		ft.		ft. in.	lb.	oz.
White Squaw	May 3	30	Aug. 14	4 6	19	2
Golden Bantam	" 3	30	" 14	6 ..	24	2
Early Fordhook	" 3	30	" 21	6 2	41	2
Early Dawn	" 3	30	" 21	5 6	24	
Early Iowa	" 3	30	" 21	4 10	18	
Perkins Extra Early	" 3	30	" 21	6 5	38	10
Early Malcolm A	" 3	30	" 21	4 5	15	8
Extra Early Adams	" 3	30	" 21	6 10	43	12
Early Malcolm B	" 3	30	" 21	4 6	12	
Malakoff	" 3	30	" 21	4 6	15	8
Metropolitan	" 3	30	Sept. 4	7 ..	27	
Pocahontas	" 3	30	Aug. 21	6 6	36	11

Topping *versus* not Topping.

Variety.	Date of Seeding.	Length of row.	Date of Bloom.	Ready to use.	Height.	Yield from the Entire Plants.	Yield from Topped Plants.
					ft. in.	lb. oz.	lb. oz.
White Squaw	May 3	30	June 6	Aug. 14	4 6	19 2	22 10
Golden Bantam	" 3	30	" 26	" 28	6 .	24 11	26
Early Fordhook	" 3	30	" 20	" 21	6 2	41 2	34
Early Dawn	" 3	30	" 20	" 21	5 6	24	23
Early Iowa	" 3	30	" 20	" 21	4 10	18	17 12
Perkins Extra Early	" 3	30	" 26	" 28	6 5	38 10	34
Early Malcolm A	" 3	30	" 13	" 21	4 5	.... ..	20 8
Extra Early Adams	" 3	30	" 22	" 21	6 10	43 12	36 2
Early Malcolm B	" 3	30	" 16	" 21	4 6	12 ..	16
Malakoff	" 3	30	" 18	" 21	4 6	15 8	17 9
Metropolitan	" 3	30	July 3	Sept. 4	7 .	27 ..	27 8
Pocahontas	" 3	30	June 22	Aug. 21	6 6	36 11	29 8

Note.—The untopped plants gave a greater return of edible green corn.

Garden Beets.—Variety Test.

Variety.	Date of sowing.	Length of row.	Ready for use.	Yield.
		ft.		lb. oz.
Meteor	April 17	30	July 6	68 8
Ruby Dulcet	" 17	30	" 13	57 8
Eclipse	" 17	30	" 13	47 12
Cardinal Globe	" 17	30	" 6	72 8
Crosby Egyptian	" 17	30	" 6	67 4
Black Red Ball	" 17	30	" 20	40 8

Sidney.

Parsnips—Variety Test.

Name.	Date of sowing.	Length of row.	Ready for use.	Yield.	
		ft.		lb.	oz.
Intermediate	April 17	30	Oct. 6	32	0
Improved Hollow Crown	" 17	30	" 6	26	8

Carrots—Variety Test.

Name.	Date of seeding.	Length of row.	Ready for use.	Yield.	
		ft.		lb.	oz.
Early Scarlet Horn	April 17	30	Aug. 2	15	12
Half long Chantenay	" 17	30	" 2	49	12
Improved Danvers	May 15	30	" 17	20	8
Long Scarlet Nantes	" 15	30	" 17	25	

Note heavy yield of Half Long Chantenay.

Peppers—Variety Test.

Name.	Date of seeding.	Length of row.	Ready to use.	Yield.	
		ft.		lb.	oz.
Hot Bell	April 23	10	Sept. 16	0	9
Long Red Cayenne	" 23	30	" 16	2	15
Red Chili	" 23	30	" 27	1	3
New Neapolitan	" 23	30	" 12	8	4

Note heavy yield of New Neapolitan.

Beans—Test of Varieties—For Green Beans and for Seed.

Name of variety.	Date of sowing.	Length of row.	Ready for use.	Height	Yield of green beans.		Colour of Seed.	Size.	Amount of seed.	
		ft.		in.	lb.	oz.			lb.	
Extra Early Valentine	May 1	30	July 16	12	16	12	Red and white	Medium	2	4
Extra Early Refugee	" 1	30	" 16	12	19	1	Purple and white	Medium	2	5
Bountiful	" 1	30	" 16	12	21	1	Yellow	Large	2	7
Valentine Wax	" 1	30	" 16	10	17	6	Red and white	Medium	2	4
Wardwell Kidney Wax	" 1	30	" 16	10	17	1	Purple and white	Very large	2	1
Fordhook Favourite	" 1	30	" 16	13	11	1	Purple and white	Large	1	13
Refugee or 1,000 to 1	" 1	30	" 31	14	19	7	Purple and white	Medium	3	1
Grennell Rustless Wax	" 1	30	" 16	10	20	..	Purple and white	Medium	2	10

Sidney.

LETTUCE—Test of Varieties.

Name.	Date of seeding.	Length of row.	Ready for use.	Weight of Yield.	
		ft.		lb.	oz.
Dreer All Heart	April 26	15	June 29	16	8
Iceberg	" 26	15	July 2	16	2
Imp Hanson	" 26	15	June 30	13	12
Grand Rapids	" 26	15	" 22	9	13
Giant Crystal Head	" 26	15	July 2	11	1

ONIONS—Test of Varieties.

Name.	Date of seeding.	Length of row.	Date of Harvest.	Weight of yield.	
		ft.		lb.	oz.
White Globe	April 17	30	Oct. 6	4	4
Yellow Globe Danvers	" 17	30	" 6	4	12
Yellow Globe	" 17	30	" 6	8	12
Dark Red Beauty	" 17	30	" 6	6	
Red Globe	" 17	30	" 6	8	12
Giant Red Wethersfield	" 17	30	" 6	8	
Red Wethersfield	" 17	30	" 6	9	4

CAULIFLOWER—Test of Varieties.

Name.	Date of seeding.	No. of plants set in 2 rows.	Ready to use.	Yield.
		ft.		
Early Snowball	April 29	40	Aug. 17	26 good heads, small but compact and handsome.
Danish Giant	" 29	40	" 21	32 good heads, medium size, very compact.
Improved Early Dwarf Erfurt	" 29	40	" 17	12 good heads, medium size, compact dwarf grower

SIDNEY.

CABBAGE—Test of Varieties.

Name.	Date of seeding.	No. of plants set.	Ready to use.	Weight of 10 Heads.
				lb.
Improved Paris Market	April 29	40	Aug. 26	19
Early Jersey Wakefield	" 29	40	" 26	22½
Copenhagen Market	" 29	40	" 26	30
Nofalt	" 29	30	Sept. 7	27
Danish Summer Ballhead	" 29	30	Oct. 16	80
Flat Swedish	" 29	30	" 16	80
Improved Amager Danish Roundhead	" 29	30	" 16	80
Extra Amager Danish Ballhead	" 29	30	" 16	80
Fottler Improved Brunswick	" 29	30	Sept. 27	70
Red Danish Delicatesse	" 29	30	Oct. 16	45
Red Danish Stonehead	" 29	30	" 16	42½

TOMATOES.—Variety test—Pruned to one stem (Jersey System).

Name.	Source of Seed.	Date of seeding.	Date of planting.	Number of Plants.	Date of Ripening.	Date of last picking	Yield Ripe.		Yield Green.	
							lb.	oz.	lb.	oz.
Extremely Early	Home Grown.	April 10	May 17	5	Aug. 9	Oct. 7	20	1	6	13
Chalks Early Jewel	"	" 10	" 17	5	" 9	" 7	21	11	12	1
Jack Rose	"	" 10	" 17	5	" 9	" 7	18	11	5	12
Florida Special	"	" 10	" 17	5	" 9	" 7	28	1	10	
Sunnybrook Earliana	"	" 10	" 17	5	" 9	" 7	13	..	3	10
Earliest Round XXX	"	" 10	" 17	5	" 4	" 7	18	4	9	8
Prosperity	"	" 10	" 17	5	" 4	" 7	20	4	7	10
N. Adironack Earliana	"	" 10	" 17	5	" 4	" 7	25	3	9	.
Alacrity	"	" 10	" 17	5	" 2	" 7	25	15	7	..
Extra Early Wealthy	.....	" 10	" 17	5	" 12	" 7	13	13	4	11
Prosperity	.....	" 10	" 17	5	" 9	" 7	17	14	5	7
N. Adironack Earliana	.....	" 10	" 17	5	" 9	" 7	15	4	7	..
Chalks Early Jewel	.....	" 10	" 17	5	" 12	" 7	19	4	7	..
Bonny Best	.....	" 10	" 17	5	" 2	" 7	15	.	4	7
Round Scarlet XXX	.....	" 10	" 17	5	July 31	" 7	14	10	7	
Jack Rose	.....	" 10	" 17	5	Aug. 14	" 7	23	5	16	..
Florida Special	.....	" 10	" 17	5	" 9	" 7	29	12	8	..
Alacrity	12a C.E.F.	" 10	" 17	5	" 9	" 7	20	..	7	..
"	14a C.E.F.	" 10	" 17	5	" 14	" 7	8	3	4	3
"	15a C.E.F.	" 10	" 17	5	" 6	" 7	17	15	5	8
"	12b C.E.F.	" 10	" 17	5	" 10	" 7	17	.	7	..
"	14b C.E.F.	" 10	" 17	5	" 3	" 7	29	5	7	..
"	23b C.E.F.	" 10	" 17	5	" 3	" 7	22	..	7	..

TOMATOES.—Methods of starting plants—Plants raised in cold frame.

Transplanted once in cold frame 3 inches by 3 inches and then planted into the field.

Name.	Date seeded.	Date Transplanted.	Date planted in field.	Date of Ripening.	No. of Plants.	Yield Ripe.		Yield Green.	Total.	
						lb.	oz.	lb.	lb.	oz.
Sunnybrook Earliana	April 16	May 29	June 17	Aug. 25	25	93	6	76	169	6
Bonny Best	" 16	" 29	" 17	" 27	25	44	..	171	215	..

SIDNEY.

Transplanted once in cold frame, then grown in strawberry punnets, planted in field at later date.

Name.	Date Seeded.	Date Transplanted.	Date planted in berry boxes.	Date planted in field.	Date of Ripening.	No. of Plants.	Yield Ripe.	Yield Green.	Total.
							lb.	lb.	lb.
Sunnybrook Earliana.....	April 16	May 29	June 17	July 5	Aug. 26	25	52	70	122
Bonny Best.....	" 16	" 29	" 17	" 5	" 31	25	26½	125	151½

TOMATOES.—Cultural Experiment—with two varieties.

Bush System. No pruning whatever.

Name.	Date of Sowing.	Date of Planting.	Date of Ripening.	Height.	No. of Plants.	Yield Ripe.	Yield Green.	Total.
				in.		lb. oz.	lb. oz.	lb. oz.
Sunnybrook Earliana.	April 16.	June 16	Aug. 25..	14	25	108 5	143 ..	251 5
Bonny Best.....	" 16.	" 16.	" 31..	11	25	53 7	265 ..	318 7..

Saanich System. Plant pinched just above first truss of bloom, 5 laterals being allowed to grow, these laterals all having sub-laterals removed, and left growing in bush form.

Name.	Date of sowing.	Date of planting.	Date of ripening.	Height.	No. of plants.	Yield ripe.	Yield Green.	Total.
				Inches.		lb. oz.	lb. oz.	lb. oz.
Sunnybrook Earliana .	April 16.	June 16 .	Aug. 25 .	10	25	64 5	106 ..	170 5
Bonny Best.....	" 16..	" 16	" 31..	11	25	37 15	161 ..	198 15

Jersey System. Plants pruned to one stem and tied to stake 5 feet long, all laterals removed.

Name.	Date of sowing.	Date of planting.	Date of ripening.	Height.	No. of plants.	Yield ripe.	Yield green.	Total.
				Inches.		lb. oz.	lb. oz.	lb. oz.
Sunnybrook Earliana..	April 16..	June 16..	Aug. 27..	18	25	53 12	39 .	92 12
Bonny Best...	" 16 .	" 16..	" 29..	30	25	63 11	56 12	120 7

SIDNEY.

Wire System. Plants pruned to one stem and tied to wires 12, 30, and 40 inches high.

Name.	Date of sowing.	Date of planting.	Date of ripening.	Height.	No. of plants.	Yield ripe.	Yield Green.	Total.
				Inches.		lb. oz.	lb. oz.	lb. oz.
Sunnybrook Earliana..	April 16	June 16..	Aug. 25..	26	25	60 20	37 ..	97 2
Bonny Best.. . . .	" 16	" 16..	" 31..	26	25	60 15	63 12	124 11

TOMATO EXPERIMENTS.—*Pruning to two stems.*

Pruned to two stems and tied to stakes 5 feet long, laterals removed as soon as possible.

Name.	Date of sowing.	Date of planting.	Date of ripening.	Height	No. of plants.	Yield ripe.	Yield green.	Total.
				Inches.		lb. oz.	lb. oz.	lb. oz.
Sunnybrook Earliana..	April 16	June 16	Aug. 28	30	25	70 10	63 ..	133 10
Bonny Best.. . .	" 16..	" 16	" 27	40	25	49 2	78 ..	127 2

Pruned to two stems and tied to wires 12, 30, and 48 inches above ground.

Name.	Date of sowing.	Date of planting.	Date of ripening.	Height.	No. of plants.	Yield ripe.	Yield Green.	Total.
				Inches.		lb. oz.	lb. oz.	lb. oz.
Sunnybrook Earliana..	April 16	June 10.	Aug. 26	28	25	83 .	55 ..	138 .
Bonny Best....	" 16	" 10	" 27	38	25	74 8	102 ..	176 8

Pruned to two stems and removing half foliage at one operation, tied to stakes.

Name.	Date of sowing.	Date of planting.	Date of ripening.	Height.	No. of plants.	Yield ripe.	Yield green.	Total.
				Inches.		lb. oz.	lb. oz.	lb. oz.
Sunnybrook Earliana..	April 16..	June 16..	Aug. 25..	34	25	90 11	52 ..	142 11
Bonny Best.....	" 16	" 16..	" 28..	42	25	74 3	101 ..	175 3

SIDNEY.

Pruned to two stems and removing extreme leaflet at first operation and extreme two leaflets later.

Name.	Date of sowing.	Date of planting.	Date of ripening.	Height.	No. of plants.	Yield ripe.	Yield Green.	Total.
				Inches.		lb. oz.	lb. oz.	lb. oz.
Sunnybrook Earliana..	April 16	June 16..	Aug. 27..	28	25	102 12	61 ..	163 12
Bonny Best.....	" 16	" 16	" 28..	40	25	69 12	125 ..	194 12

TOMATOES.—Test of Varieties.

Pruned to one stem, and removing half foliage at one operation, tied to stakes.

Name.	Date of sowing.	Date of planting.	Date of ripening.	Height.	No. of plants.	Yield ripe.	Yield green.	Total.
				Inches.		lb. oz.	lb. oz.	lb. oz.
Sunnybrook Earliana..	April 12	June 16..	Aug. 27..	24	25	61 ..	28 ..	89 ..
Bonny Best.....	" 12	" 16	" 31..	40	25	61 11	46 8	108 3

Pruned to one stem, and removing extreme leaflet at first operation, the extreme two leaflets at later date.

Name.	Date of sowing.	Date of planting.	Date of ripening.	Height.	No. of plants.	Yield ripe.	Yield Green.	Total.
				Inches.		lb. oz.	lb. oz.	lb. oz.
Sunnybrook Earliana..	April 12..	June 16..	Aug. 28..	24	25	41 9	19 ..	60 9
Bonny Best.....	" 12..	" 16..	" 31..	36	25	57 11	42 12	100 7

SIDNEY.

TOMATO EXPERIMENT.—Test of Systems of Ripening, applied to Green Tomatoes.

Twelve systems of ripening were tried. Ten full grown green tomatoes and ten fully developed tomatoes showing a trace of colour. All tomatoes were of the "Bonny Best" variety. Temperatures taken twice daily. Date of commencing the experiment, October 25.

Method of Ripening.	Condition of ripeness at start.	Number used.	Number. ripened	Number. diseased	Mean Temp. for period.	Date of Ripening.
1. Placed in the sun, glass underneath	Green	10	Frozen			
" "	Trace of red	10	"			
2. Placed in the shade, position moderately warm	Green	10	7	3	48·3°	Nov. 27
Placed in the shade, position moderately warm	Trace of red	10	8	2	48·7°	" 20
3. Placed in closed box without ventilation	Green	10	4	6	46·2°	Dec. 18
" "	Trace of red	10	9	1	48·0°	" 4
4. Placed on boards in cold frame, sash on, ventilation given if temperature went above 55	Green	10	3	7	42·0°	" 11
Placed on boards in cold frame, sash on, ventilation given if temperature went above 55	Trace of red	10	10	0	47·0°	Nov. 6
5. Placed on boards in cold frame, sash on, ventilation given if temperature went above 55. Boards set up on bricks	Green	10	5	5	42·0°	Dec. 11
Placed on boards in cold frame, sash on, ventilation given if temperature went above 55. Boards set up on bricks	Trace of red	10	10	0	50·0°	" 11
6. Placed on straw in cold frame, ventilation given if temperature went above 55. Straw on soil	Green	10	5	5	43·5°	Nov. 20
6. Placed on straw in cold frame, ventilation given if temperature went above 55. Straw on soil	Trace of red	10	10	0	48·90°	" 3
7. Placed on straw in cold frame, sash on, ventilation given if temperature went above 55. Straw on raised boards	Green	10	7	3	42·0°	Dec. 11
Placed on straw in cold frame, sash on, ventilation given if temperature went above 55. Straw on raised boards	Trace of red	10	10	0	47·0°	Nov. 6
8. Placed in Buckwheat husks, closed box, kept at moderate temperature	Green	10	10	0	49·5°	" 13
Placed in Buckwheat husks, closed box, kept in moderate temperature	Trace of red	10	6	4	47·7°	Dec. 11
9. Placed in a closed box, each fruit being wrapped in paper, kept at moderate temperature	Green	10	4	6	48·0°	" 4
9. Placed in a closed box, each fruit being wrapped in paper, kept at moderate temperature	Trace of red	10	7	3	48·7°	Nov. 20
10. Plants hung in moderately warm building	Green	36	36	0	47·7°	Dec 11
" "	Trace of red	6	plants, fruit fell off before ripening.			
11. Placed in closed box, 5 tiers of fruit, moderate temperature	Green	10	4	6	48·0°	Dec. 4
Placed in closed box, 5 tiers of fruit, moderate temperature	Trace of red	10	0	10		
12. Placed in closed box, with straw between each layer, moderate temperature	Green	10	7	3	47·2°	Dec. 22
Placed in closed box, with straw between each layer, moderate temperature	Trace of red	10	10	0	50·4°	Nov. 6

NOTE.—In the ripening of tomatoes, those placed on boards and straw ripened the quickest. Care must be taken to put the fruits away dry, and they must be kept dry. Slugs become troublesome if conditions are damp.

Method 10 gives very satisfactory results if the plant contains considerable moisture and the fruit is green; plants with partly ripened fruit are not a success.

Method 12 gave splendid results, fruits were firm and of fine quality.

SIDNEY.

TEST OF VARIETIES.—*Pumpkins, Watermelon, Squash, Cucumber.*

Variety.	Date of Seeding.	Number of Hills.	Date of bloom.	Ready to use.	Yield.	
					lb.	oz.
Pumpkin, Sweet as Sugar	May 12	3	June 13.	Oct. 7..	88	4
" Jumbo	" 12	3	" 16	" 7..	50	8
" Large Field	" 12	3	" 12	" 7.	49	..
Watermelon, Red Citron	" 12	3	" 17	" 7.	34	8
Muskmelon, Earliest ripe	" 12	3	" 20	" 7.	4	8
" Imp. Rocky Ford	" 12	3	" 20	" 7.	7	12
Squash White Bush Marrow	" 12	3	" 12	June 31	75	4
" White Bush Scallop	" 12	3	" 12	July 14	61	3
" Delicious	" 12	3	" 26.	Sept. 11.	21	12
" Long White Vegetable Marrow	" 12	3	" 6	June 31.	80	7
" Golden Hubbard	" 12	3	" 21	Sept. 11..	8	3
" Summer Crookneck	" 12	3	" 20	July 14	27	3
" Delicata	" 12	3	" 31	Sept. 11	24	8
Cucumber Extra Early Russian	" 12	3	" 12	July 7.	11	2
" Peerless Imp. White Spine	" 12	3	" 12	" 14	11	12
" Cool and Crisp	" 12	3	" 12	" 14..	12	4
" Davis Perfect	" 12	3	" 12	" 14.	8	12
" Giant Pera	" 12	3	" 12	" 14.	17	5
" Fordhook Famous	" 12	3	" 12	" 14	8	10
" Prize Pickle	" 12	3	" 12	" 28	5	..

CULTURAL EXPERIMENTS.—Thinning to different distances with Carrots, Beets and Parsnips.

Name.	Date Seeded	Length of row.	Thinned.	Ready to use.	Yield.		Remarks.
		Feet.	Inches.		lb.	oz.	
Chantenay Carrot	April 24	33⅓	1½	July 26	43	8	Very desirable.
"	" 24	33⅓	2	" 26	42	4	"
"	" 24	33⅓	3	" 26.	33	4	Little too large.
Early Model Beet	" 24	33⅓	2	" 20	40		Very fine, best shape, firm.
"	" 24	33⅓	3	" 20	50	8	Smooth, most uniform.
"	" 24	33⅓	4	" 26	36		Firm and of good appearence.
Hollow Crown Parsnip	" 24	33⅓	2	.....	20	4	
"	" 24	33⅓	3	.....	20	4	
"	" 24	33⅓	4	.....	16	8	

EXPERIMENTS with Drought-resisting Lettuce—to find which variety keeps in marketable condition longest.

Name.	Date of Seeding.	Length of row.	Ready to use.	Commence to seed.
		Feet.		
Dreer All Heart	April 17....	30	June 29...	July 20
Iceberg	" 17....	30	July 2...	Aug. 10
Imp. Hanson	" 17....	30	June 30...	Aug. 3
Grand Rapids	" 17...	30	" 22....	July 26
Giant Crystal Head	" 17....	30	July 2....	Aug. 6

Iceberg and Giant Crystal Head proved the best under dry conditions.

CULTURAL Experiment for Protection from Cabbage Maggots.—Two varieties of Cabbage and two varieties of Cauliflower used in this experiment. Tar paper discs and cheese cloth covering methods were used. Every third row unprotected.

Name of variety.	Date of seeding	Number of plants.	Date of planting.	Treatment.	Affected by Maggot	Died from other causes.	Matured.
Cauliflower Early Snowball	April 29	25	July 2	None	2	2	21
" "	" 29	25	" 2	Tar paper discs.	0	1	24
" "	" 29	25	" 2	Cheese cloth	0	12	13
" Imp Early Dwarf Erfurt	" 29	25	" 2	None	2	0	23
" " "	" 29	25	" 2	Tar paper discs.	0	3	22
" " "	" 29	25	" 2	Cheese cloth	0	8	17
Cabbage Early Jersey Wakefield	" 29	25	" 2	None	0	0	25
" " "	" 29	25	" 2	Tar paper discs.	0	0	25
" " "	" 29	25	" 2	Cheese cloth	0	2	23
" Copenhagen Market	" 29	25	" 2	None	0	0	25
" "	" 29	25	" 2	Tar paper discs.	0	1	24
" " "	" 29	25	" 2	Cheese cloth	0	4	21

The four plants in the entire area affected, were of those that received no treatment.

POTATO EXPERIMENTS.

SPROUTED versus Unsprouted.

Variety.	Treatment.	Date of Planting.	Yield per acre
			Tons pounds.
American Wonder	Unsprouted	May 7	4 1,668
" "	Sprouted	" 7	7 1,576

Note increased yield from sprouted seed.

LEVEL Cultivation versus Hilled.

Variety.	Treatment.	Date of planting.	Yield per acre.
			Tons pounds
Late Puritan	Hilled after first cultivation	May 7	7 1,312
"	Level, four cultivations	" 7	6 672

Note increased yield from hilling.

The dates of planting for all potato work proved much too late for an abnormal season. The experience of the season indicates that potato culture on the light soils must begin with the planting as soon as the soil is in good condition to till.

SIDNEY.

DIFFERENT Dates of Planting. Soil, light loam.

Variety.	Date of Planting.	Yield per acre	
		Tons.	Lb.
Early Norther	May 6	2	488
"	" 20	1	1960
"	June 3	1	640
"	" 17	..	1,748
"	July 2	..	792
"	" 19	..	396

Note the poor yields obtained from late plantings. The percentage of marketable potatoes also decreased with the late plantings. If results are to be obtained in potato growing on light soils, the plantings must be sufficiently early that the growing plant may receive the benefit of all moisture there is in the soil.

KIND of set best suited to light soils of district.

A. Variety and type used "The Factor", buds from seed end only.

Type of Set.	Yield per acre.	
	Tons.	Lb.
1. Whole small potato under two inches either way, average weight of set, 1 and $\frac{1}{6}$ ounces	2	1,676
2. Set from medium to large potato, cut to one bud, average weight 1 ounce	2	488
3. Set from medium to large potato cut to two buds, average weight $\frac{5}{6}$ ounce	2	1,544
4. Set from medium to large potato cut to three or more buds, average weight $1\frac{1}{4}$ ounces	2	1,550

B. Variety and type used "Dalmeny Hero", buds from seed end to base.

1. Whole small potato under two inches either way, average weight of set 1 and $\frac{1}{6}$ ounces	2	92
2. Set from medium to large potato cut to one bud, average weight 1 ounce	2	756
3. Set from medium to large potato cut to two buds, average weight $\frac{5}{6}$ ounce	2	1,018
4. Set from medium to large potato cut to three or more buds, average weight $1\frac{1}{4}$ ounces	2	1,802

AUTUMN PLANTING.

This experiment was conducted to determine if any gain of time could be made over spring planting.

Variety.	Date of Planting.	Growth Started.	Ready to Market.	Ripe.	Yield per acre. Tons.	Pounds.
Early Hebron	Oct. 17	Mar. 22	June 25	July 26	3	552
Early Rose	" 17	" 22	" 25	" 26	2	464
Manistee	" 17	" 22	" 25	" 26	3	292
Eureka Extra Early	" 17	" 22	" 20	" 21	2	1,720
Houlton Rose	" 17	" 22	" 23	" 21	4	118
Rochester Rose	" 17	" 22	" 25	" 26	3	1,128
Morgan Seedling	" 17	" 29	" 30	" 26	4	1,174
Everett	" 17	" 22	" 25	" 26	3	424
Vick Extra Early	" 17	" 29	" 20	" 21	2	1,544
Reeves Rose	" 17	" 22	" 25	" 26	2	884
Burpee Extra Early	" 17	" 22	" 20	" 21	1	1,300
Early Six Weeks	" 17	April 1	" 20	" 21	1	1,000
Early Ohio	" 17	" 6	" 25	" 26	1	1,168

The only advantage shown by autumn planting was that the work was done at a period of the year when labour pressure was not great. Early spring planting, with well sprouted seed, would give a marketable potato at an earlier date than the autumn planted seed.

TEST OF VARIETIES.

Listed in order of productiveness for season 1915:—

1. Table Talk.
2. Irish Cobbler.
3. The Factor.
4. Manistee.
5. Conquering Hero.
6. Dobbie Prolific.
7. Houlton Rose.
8. Dreer Standard.
9. Late Puritan.
10. Money Maker.
11. Vick Extra Early.
12. Gold Coin.
13. Up-to-date.
14. American Wonder.
15. Sir Walter Raleigh.
16. Empire State.
17. Bovee.
18. Vermont Gold Coin.
19. Morgan Seedling.
20. Carman No. 1.
21. Dalmeny Beauty.
22. Rochester Rose.
23. New Queen.
24. White City.
25. Early White Albino.
26. Dalmeny Hero.
27. Reeves Rose.
28. The Scott.
29. Scottish Triumph.
30. Early Rose.
31. Snow.
32. Hard to Beat.
33. Everett.
34. Early Hebron.
35. Early Moonlight.
36. Carman No. 3.
37. Clyde.
38. Early Norther.
39. Early Six Weeks.
40. Pan American.
41. Early May.
42. Todd Wonder.
43. Champion.
44. Early Ohio.
45. Burpee Extra Early.
46. Delaware.
47. Eureka Extra Early.

SIDNEY.

BULBS.

EXPERIMENT OF SCOOPING AND SCORING BULBS FOR MOTHER BULBS.

Four varieties of tulips, three of daffodils and three of hyacinths were selected for this experiment.

The tulip and daffodil bulbs averaged 1 ounce in weight, while the hyacinth bulbs averaged less than 3 ounces. Twelve tulip bulbs were used in each method, while but six of each of the varieties of daffodils and but three of hyacinths were tested.

All scoring was done with a knife, from four to six cuts made in the bulb according to size and shape. The scooping of the tulip and daffodil bulbs was done with a drill, while a knife was used for the same operation on the hyacinth bulbs. After scooping and scoring the bulbs were set in moist sand in a cold frame where they remained for 119 days, July 19 to November 16. After the end of this period they were lifted, the increase of bulblets was counted and then reset in the field to develop. The scoring process gave the greatest increase of bulblets with tulips and daffodils while scooping gave the largest increase with hyacinths.

Variety.	Treatment.	Increase in bulblets per bulb.
Tulip Duchesse de Parma	Scooped	5
" " "	Scored	16
" Chrysolora	Scooped	7
" "	Scored	12
" Picotee	Scooped	3
" "	Scored	9
" La Candeur	Scooped	9
" "	Scored	35
Daffodil Frank Miles	Scooped	16
" " "	Scored	38
" Horsfieldi	Scooped	10
" "	Scored	20
" incomparabilis	Scooped	11
" "	Scored	32
Hyacinth Madame Van der Hoop	Scooped	32
" " " "	Scored	20
" Enchantress	Scooped	57
" "	Scored	14
" King of the Blues	Scooped	80
" " "	Scored	24

TEST of Varieties of Bulbs—Home grown *versus* Imported and Locally grown.

Name.	Source.	Number planted.	Quality	Date of planting.	Increase. 1st	2nd	3rd	Total.	Vigor.	Width of flower.	Height.	Began to flower.	Full bloom.	Bloom over.
										inch.	inch.			
Tulip Murillo	Home grown	51	Very good	Oct. 24	54	53	35	142	1	5½	12	Mar. 29	April 10	May 7
Tulip Murillo	Imported	102	Good	" 24	116	142	73	331	2	5¼	12	April 8	April 19	May 14
Tulip Pottebakker White	Home grown	51	Very good	" 24	43	31	51	124	2	6	12	Mar. 22	Mar. 29	April 27
Tulip Pottebakker White	Imported	102	Very good	" 24	107	87	83	277	1	6½	11	Mar. 29	April 8	May 1
Tulip Thomas Moore	Locally grown	100	Excellent	" 24	100	79	54	233	1	6¾	12	April 1	April 15	May 4
Tulip Thomas Moore	Imported	100	Excellent	" 24	112	255	139	506	2	6¼	12	April 8	April 21	May 7
Tulip Couronne d'or	Home grown	100	Excellent	" 24	100	110	130	340	1	5¾	13	Mar. 29	April 8	May 6
Tulip Couronne d'or	Imported	100	Excellent	" 24	107	189	141	437	1	5½	10	April 6	April 19	May 14
Tulip Imperator rubrorum	Home grown	100	Excellent	" 24	100	87	149	336	1	5¼	10	Mar. 29	April 8	May 14
Tulip Imperator rubrorum	Imported	100	Excellent	" 24	104	216	164	484	2	5¼	9	April 6	April 19	May 14
Tulip Joost Van Vondel, white	Home grown	100	Very good	" 24	88	27	55	170	2	¼	10	Mar. 29	April 6	May 1
Tulip Joost Van Vondel, white	Imported	100	Very good	" 24	101	54	26	181	1	7½	10	April 1	April 10	May 3
Tulip Cottage Maid	Home grown	100	Very good	" 24	132	123	141	396	1	7	10	Mar. 29	April 6	May 1
Tulip Cottage Maid	Imported	100	Very good	" 24	100	97	93	290	2	5½	9	April 6	April 15	May 3
Tulip Proserpine	Home grown	100	Excellent	" 24	87	'61	71	221	1	7	12	Mar. 8	Mar. 22	April 25
Tulip Proserpine	Locally grown	100	Excellent	" 24	97	23	60	180	1	7¼	13	Mar. 22	Mar. 29	May 1
Tulip Proserpine	Imported	100	Excellent	" 24	101	91	86	278	1	6¾	12	Mar. 29	April 8	May 5
Tulip Vermilion Brilliant	Home grown	100	Very good	" 23	102	68	113	285	1	6½	11	Mar. 8	Mar. 26	May 1
Tulip Vermilion Brilliant	Locally grown	100	Very good	" 23	84	79	80	243	1	5¾	11	Mar. 22	Mar. 29	May 3
Tulip Vermilion Brilliant	Imported	100	Very good	" 23	96	69	104	269	1	6	10	Mar. 29	April 8	May 3
Tulip Chrysolora	Home grown	100	Excellent	" 23	97	133	95	325	1	7	12	Mar. 8	Mar. 15	May 1
Tulip Chrysolora	Locally grown	100	Excellent	" 23	100	82	86	268	1	6½	11	Mar. 22	April 1	May 3
Tulip Chrysolora	Imported	100	Excellent	" 23	99	37	74	210	1	7	11	April 1	April 8	May 5
Tulip Artus	Home grown	100	Excellent	" 23	190	120	36	346	2	6¾	11	April 1	April 10	April 30
Tulip Artus	Locally grown	100	Excellent	" 23	166	121	73	360	3	6¾	11	April 8	April 19	May 3
Tulip Artus	Imported	100	Excellent	" 23	184	121	95	400	1	6¾	11	April 10	April 20	May 6
Tulip La Reine	Home grown	100	Very good	" 23	105	135	33	273	1	5¾	11	Mar. 22	Mar. 29	May 1
Tulip La Reine	Locally grown	100	Very good	" 23	128	126	43	296	1	5¼	10	April 1	April 10	May 1
Tulip La Reine	Imported	100	Very good	" 23	142	207	62	411	1	6	10	April 6	April 17	May 3
Tulip Duchesse de Parma	Home grown	100	Excellent	" 23	140	138	82	360	1	7¾	14	Mar. 29	April 6	April 30
Tulip Duchesse de Parma	Locally grown	100	Excellent	" 23	113	47	44	204	1	6¾	13	April 1	April 10	April 30
Tulip Duchesse de Parma	Imported	100	Excellent	" 23	147	136	74	357	1	6¼	13	April 6	April 15	May 3
Tulip Keizerskroon	Home grown	100	Excellent	" 23	147	92	57	296	1	8½	15	Mar. 15	Mar. 22	May 3
Tulip Keizerskroon	Locally grown	100	Excellent	" 23	104	57	52	213	3	7¼	15	Mar. 29	April 6	May 1
Tulip Keizerskroon	Imported	100	Excellent	" 23	144	85	59	288	2	7¼	14	April 6	April 15	April 30

SIDNEY.

LIST of Varieties of Bulbs—Home grown *versus* Imported and Locally grown.—*Con.*

Name of Variety.	Source.	Number planted.	Quality.	Increase.			Total.	Width of bloom.	Height.	Began to bloom.	Full bloom.	Bloom over.
				1st	2nd	3rd		inch.	inch.			
Daffodil Incomparabilis Cynosure	Home grown	25	Excellent	25	25	7	57	4	17	Mar. 29	April 6	April 26
Daffodil Incomparabilis Cynosure	Imported	25	Excellent	43	34	9	86	4	18	April 6	April 15	April 30
Daffodil Alba plena odorata	Home grown	25	Very good	28	9	8	45	3	15	April 1	April 10	April 30
Daffodil Alba plena odorata	Imported	25	Very good	25	7	3	35	2½	12	April 27	May 3	May 22
Daffodil Incomparabilis Figaro	Home grown	25	Very good	32	62	11	105	2¾	16	Mar. 22	Mar. 29	April 26
Daffodil Incomparabilis Figaro	Imported	25	Very good	28	10	5	43	4	14	April 6	April 17	May 1
Daffodil Incomparabilis plenus	Home grown	25	Very good	30	19	0	49	3	15	Mar. 22	Mar. 29	April 28
Daffodil Incomparabilis plenus	Imported	25	Very good	30	13	6	49	3	15	Mar. 29	April 6	May 5
Daffodil bicolor Victoria	Home grown	25	Very good	30	29	72	131	3¼	14	Mar. 29	April 6	April 23
Daffodil bicolor Victoria	Imported	25	Very good	25	5	16	46	3½	14	April 6	April 19	April 30
Daffodil bicolor Victoria	Locally grown	25	Very good	39	24	90	153	3¾	16	April 1	April 10	April 28
Daffodil Orange Phoenix	Home grown	25	Excellent	34	14	4	52	3½	13	Mar. 22	April 6	April 28
Daffodil Orange Phoenix	Imported	25	Excellent	33	10	0	43	3½	17	April 8	April 19	May 6
Daffodil Orange Phoenix	Locally grown	25	Excellent	41	5	0	46	3½	14	April 6	April 19	May 5
Daffodil Princeps	Home grown	25	Excellent	42	41	0	83	3¾	14	Mar. 15	Mar. 22	April 26
Daffodil Princeps	Imported	25	Excellent	58	8	7	73	4¼	15	Mar. 22	Mar. 29	April 30
Daffodil Princeps	Locally grown	25	Excellent	33	22	12	67	3¾	14	Mar. 22	Mar. 29	April 30
Daffodil Emperor	Home grown	25	Excellent	41	2	0	43	4	18	Mar. 22	Mar. 29	April 26
Daffodil Emperor	Imported	25	Excellent	51	0	0	51	3¼	20	April 6	April 15	April 30
Daffodil Emperor	Locally grown	25	Excellent	47	0	0	47	3¼	18	Mar. 29	April 6	April 30
Daffodil Barri Conspicuus	Home grown	25	Excellent	50	0	0	50	3½	15	Mar. 29	April 6	April 26
Daffodil Barri Conspicuus	Imported	25	Excellent	51	0	0	51	4	18	April 6	April 15	April 30
Daffodil Barri Conspicuus	Locally grown	25	Excellent	33	14	0	47	3½	17	April 1	April 10	April 28
Daffodil Golden Spur	Home grown	25	Excellent	48	9	0	57	4	17	Mar. 8	Mar. 15	April 10
Daffodil Golden Spur	Imported	25	Excellent	50	10	5	60	4¼	19	Mar. 29	April 6	April 30
Daffodil Golden Spur	Locally grown	25	Excellent	28	16	0	44	3½	15	Mar. 15	Mar. 22	April 19
Daffodil Empress	Home grown	25	Excellent	39	4	0	43	4¼	17	Mar. 29	April 6	April 27
Daffodil Empress	Imported	25	Excellent	52	0	0	52	4¼	16	April 6	April 15	May 1
Daffodil Empress	Locally grown	25	Excellent	44	6	0	50	4¼	16	April 6	April 10	April 30
Daffodil Sir Watkin	Home grown	25	Excellent	51	0	0	51	4¼	20	Mar. 22	Mar. 29	April 22
Daffodil Sir Watkin	Imported	25	Excellent	51	4	0	55	4¼	21	April 1	April 10	April 30
Daffodil Sir Watkin	Locally grown	25	Excellent	22	8	0	30	4	17	Mar. 29	April 6	April 26

The most striking feature of this experiment is the early and more durable bloom of the home grown bulbs.
The home grown Tulip bulbs proved superior in increase, more frequently than did the bulbs from other sources.
The Daffodil bulbs held their own in every instance and made a gain in a number of the tests.

EXPERIMENT TO FIND THE WEIGHT OF INCREASE OF BULBS BY MANIPULATING THE BLOOM AT CERTAIN PERIODS.

Fifty bulbs allowed to bloom and to seed. Fifty bulbs allowed to bloom, bloom cut at prime. Fifty bulbs allowed to bud and cut at commencement of bloom.

Name of Variety.	Date of planting.	Treatment.	Yield—Grade			Weight of bulbs		Began to bloom.
			1st	2nd	3rd	Lb.	Oz.	
Tulip Artus	Oct. 24	Mature	77	52	105	6	14	April 8 to May 3.
Tulip Artus	" 24	Prime	83	82	83	7	3	
Tulip Artus	" 24	Bud	88	28	82	6	6	
Tulip Duchesse de Parma	" 24	Mature	59	60	52	4	10	April 3 to April 30.
Tulip Duchesse de Parma	" 24	Prime	62	65	51	5	6	
Tulip Duchesse de Parma	" 24	Bud	54	68	71	5	7	
Tulip Chrysolora	" 24	Mature	50	0	17	3	..	April 1 to May 3.
Tulip Chrysolora	" 24	Prime	50	12	102	4	2	
Tulip Chyrsolora	" 24	Bud	50	23	112	2	10	

REMARKS.—The bulbs of Artus plucked in their prime were very good bulbs, in some cases one bulb throwing three flowering bulbs for next year.

EXPERIMENT WITH GRADES OF BULBS—TO FIND HOW SOON AND WHAT PERCENTAGE OF EACH GRADE WILL FLOWER.

Name.	No. planted.	Grade.	No. that Flowered.	Height.	Date of Bloom.	Remarks.
				In.		
Daffodil Golden Spur....	25	Third ..	1	10	....	Plant weak.
" " "	25	Second..	15	15	March 8 to April 19	Plant medium.
" Princeps.....	25	Third ..	1	10	March 22 to April 1.	Plant weak.
" "	25	Second..	17	12	March 22 to April 19	Plant medium.
" Incomparabilis plenus.....	25	Third ..	3	14	March 29 to April 8.	Plant weak.
" Incomparabilis plenus.	25	Second..	15	14	April 6 to May 22...	Plant weak.
Tulip Chrysolora.....	64	" .	32	10	March 15 to April 30	Slight difference in size of leaf, no difference in size of flower from that of 1st class bulb.
" "	100	Third ..	0		....	Formed one leaf.
" Artus.....	200	Second..	157	10	March 22 to April 30	Leaf smaller than that of 1st class bulbs, flowers as large as those of 1st class bulbs.
" "	100	Third ..	6	9	....	Formed one stout leaf.
" Duchesse de Parma	200	Second..	176	11	April 1 to April 30..	Smaller leaf, but bloom as large as those of 1st class bulbs.
" " "	100	Third ..	14	10	April 1 to April 28..	Formed one stout leaf.

The second grade tulips in the above experiments weighed one and one-half pounds per hundred.

The third grade tulips in the above experiment weighed five and one-half ounces per hundred.

EXPERIMENTS WITH FLOWERING BULBS.

An experiment to find at what period of ripeness the epidermis of bulbs is in the best condition for storing. In this experiment fifteen rows of twenty bulbs each, of the Pottebakker White variety were set on October 27. These will be lifted during 1916, commencing first week in June, one row each week. The soil in which these bulbs were set, is a red sandy loam. Results of this experiment will appear in 1916 report.

An experiment to find which of the following methods of storage will give best results.

Placed in trays and kept in the dark.
Placed in trays and kept in medium light.
Placed in trays and kept in full light.
Stored in bulk in dry sand.
Stored in bulk in dry wood ashes.
Stored in bulk in dry buckwheat bran.
Heeled in in the soil to a depth of 6 inches.
Placed on shelves, medium light, good air circulation.
Placed in loft, perfectly dark, good air circulation.
Placed in loft, medium light, good air circulation.
Placed in loft, full light, good air circulation.
Results of this experiment will appear in 1916 report.

SIDNEY.

With gladioli seed sown in frames:—

Variety.	No. of rows.	Date of sowing.	Date of Germination.	Season's growth.
				Inches.
Joseph Hulot	1	June 22	July 26	3
Niagara	1	" 22	" 26	5
America	1	" 22	" 26	9
Willy Wigman	1	" 22	" 23	6
Glory of Holland	1	" 22	" 23	8
Lily Lehmaa	1	" 22	" 26	7

NOTE.—The second grade corms made good first grade corms after one season's growth.

Small corms made good second-grade corms with many more small corms.

Seed sown outside made very poor showing.

Seed sown in frame made good-sized bulblets.

An experiment to find how soon second grade gladioli corms, small corms, and seeds will flower, percentage of bloom, quality and development of corm.

With second grade corms:—

Six Joseph Hulot, two Niagara, two Princeps, two Glory of Holland, two Willy Wigman, having a combined weight of one pound were set, eight grew and attained an average height of 28 inches; started to bloom on September 1 and continued to September 26.

With Small Corms. Variety.	No. set.	Percentage developed to second grade stage.	Season's growth of leaves.
			Inches.
Pink Beauty	100	40	22
Joseph Hulot	100	33	15
America	100	7	8
Niagara	100	0	0
Willy Wigmaa	100	4	6
Halley	100	41	7

With gladioli seed, sown outdoors:—

Variety.	No. of rows.	Date of sowing.	Date of germination.
Joseph Hulot	1	May 1	Oct. 26
America	1	" 1	" 26
Niagara	1	" 1	Nov. 4
Willy Wigman	1	" 1	" 4
Glory of Holland	1	" 1	Oct. 26
Lily Lehman	1	" 1	" 26

SIDNEY.

The following varieties of flowering bulbs are being grown for distribution to other Farms and Stations:—

Tulip Artus.
" Joost Van Vondel, red.
" La Reine.
" Cottage Maid.
" Duchesse de Parma.
" Rose Grisdelin.
" Thomas Moore.
" Couleur de Cardinal.
" Joost Van Vondel, white.
" Pottebakker, red.
" Yellow Prince.
" Vermilion Brilliant.
" Proserpine.
" Pottebakker White.
" Keizerskroon.
" Mon Trésor.
" Chrysolora.
" L'immaculée.
" La Candeur.
" Imperator Rubrorum.
" Couronne d'Or.
" Yellow Rose.
" Murillo.
" Gloria Solus.
" Sunset.
" Viridiflora.

Tulip Picotée.
" Caledonia.
" Fairy Queen.
" Gesneriana spathulata.
" Inglescombe Yellow.
" La Merveille.
" Isabella.
" Darwin mixed.

Daffodil Princeps.
" Golden Spur.
" Single van Sion.
" bicolor Victoria.
" " Empress.
" Frank Miles.
" Barri conspicuus.
" incomparabilis Cynosure.
" " Figaro.
" " Sir Watkin.
" " Plenus.
" Orange Phœnix.
" double van Sion.
" Albo pleno odorata.
" poeticus ornatus.

Parrot Tulip Lutea major.
" " Perfecta.

Tulips, auxillary bulblets of Murillo, Pottebakker Red, Baronne de la Tonnaye.

TEST OF VARIETIES OF JAPANESE LILIES.

The following varieties of lilies secured from Japan were set on December 3. A report as to their adaptability and usefulness will be made in the report for 1916.

Lilium Leichtlini.
" *Browni var odorum.*
" *rubellum.*
" *Krameri.*
" *Hansoni.*
" *cordifolium.*
" *coridion var Okihime.*
" *tigrinum Fortunei giganteum.*

Lilium Henryi.
" *speciosum Melpomene.*
" " *album.*
" " *rubrum.*
" " *magnificum.*
" *auratum.*

SIDNEY.

ANNUALS.

ANNUAL FLOWERING PLANTS—STARTED IN HOTBED.

Seeds of all the following flowering plants were sown in hotbed on April 12, and the resulting young plants were set in rows on May 28 and June 9. The work was carried on entirely under field conditions—no water was applied after the plants were set.

Name or description.	Commenced to bloom.	Height.	Merit.
		Inches.	
Aster Pink Enchantress	Aug. 10	18	Special.
" Giant Daybreak	" 10	18	Ordinary.
" Pink King	" 18	18	Special.
" Rose King	" 18	22	Ordinary.
" White King	" 18	15	Special.
" Crimson King	" 10	15	Ordinary.
" Early Branching Lavender	" 10	15	Special.
" Early Branching Rose	" 4	18	Ordinary.
" Early Branching White	" 10	18	Ordinary.
" Semple Branching Pink	" 17	23	Special.
" Victoria Light Yellow	" 18	12	"
" Imperial Yellow	" 18	12	"
" Late Branching Dark Violet	" 10	20	Ordinary.
" Late Branching Snow White	" 19	16	"
" Late Upright	" 10	15	"
" Truffauts Paeony	" 2	18	"
" Imperial Violet	" 19	18	"
" Primrose Queen	" 14	16	Special.
" Exhibition Wonder	" 9	10	"
" Large Purple Ray	" 2	.....	"
" Old Rose	" 4	15	Ordinary.
" Giant Ray	" 4	9	"
" Snowball	" 2	6	Special.
" Ostrich Plume	" 4	14	Ordinary.
" Giant French	" 10	14	"
" Giant Pink Ray	" 4	15	Special.
" Blushing Beauty	" 28	18	"
" Fire King	" 17	6	"
" Giant Comet	" 4	18	"
Antirrhinum Tom Thumb Rose	" 9	.....	Ordinary.
" Tom Thumb Orange	" 26	.....	"
" Tom Thumb Crimson	" 26	.....	"
" Tom Thumb Yellow	" 9	.....	"
" Tall Superb	" 9	.....	"
" Tom Thumb White	" 18	.....	"
" Intermediate Delicate Pink	" 18	.....	"
" Intermediate Bright Crimson	" 18	.....	"
" Intermediate Delicate Shades	" 9	.....	"
" Intermediate Yellow	" 9	.....	"
Amaranthus tricolor	July 26	20	"
Alonsoa Warscewiczii compacta	Aug. 4	21	Special.
Arctotis grandis	July 13	21	"
Balsam Camellia flowered	" 13	15	"
Browallia elata blue	" 28	18	"
Cosmea, Early Flowering	" 6	36	Ordinary.
Celosia pyramidalis	June 28	6	Special.
Cockscomb, Dwarf Crimson	" 28	6	"
Coreopsis cardaminifolia	July 13	12	"
" Mixed colours	June 26	15	"
" *tinctoria*	" 21	24	"
" *atrosanguinea*	July 6	32	"
Dianthus superbissimus	" 6	9	"
" *Heddewigii*	" 20	8	"
Dimorphotheca aurantiaca	" 6	10	"
Ipomaea rubro coerulea	" 26	36	"
Kochia trichophylla	Aug. 26	36	"
Marigold, French Tall	June 14	32	"
" " Single	" 28	24	"

SIDNEY.

ANNUAL FLOWERING PLANTS—STARTED IN HOT BEDS.—*Continued.*

Name or description.	Commenced to bloom.	Height.	Merit.
Nemesia Large Apricot	June 24	12	Special.
" " Mixed	" 21	17	Ordinary.
" " Scarlet	" 21	15	Special.
" " Orange	" 21	10	"
" " Rose Pink	" 21	15	Ordinary.
" " White	" 24	13	"
" Choice Mottled	" 14	12	"
Nicotiana affinis, hybrids	July 6	48	Special.
Portulaca, Improved double	" 13	6	"
Phlox Drummondii Intermediate mixed	" 6	12	"
" Large-flowered Carmine	" 6	8	Ordinary.
" " Salmon	June 28	12	"
" " Scarlet	July 13	12	"
" " Deep Crimson	June 26	12	Special.
" " White	" 26	12	"
" " Blue	" 26	12	Ordinary.
Petunia, Single Superb	" 15	15	"
Ricinus communis major	July 20	54	"
Scabious, Large Mixed	" 26	24	Special.
Salpiglossis, Mixed	" 26	24	"
" Large Mixed	" 13	36	"
" Choice selected	" 6	36	"
Salvia, Summer Fireball	" 20	15	"
" Scarlet Queen	Sept. 7	24	Ordinary.
Schizanthus, Veitch Hybrids	July 20	14	Special.
" Selected	" 6	18	"
Stock, Ten Week Blue	June 30	17	"
" " Rose	July 6	13	"
" " Purple	" 20	15	"
" " Yellow	" 6	14	"
" " White	" 4	13	"
Tagetes signata pumila	June 21	9	"
Verbena, Giant Auricula	July 6	12	Ordinary.
" Imp. Pulcherrima	June 24	9	Special.
" Superb Bedding	July 4	9	Ordinary.
Zinnia, Double Fireball	June 21	8	"
" Elegans Coccinea	" 14	22	"
" Giant Double	" 26	16	"
" Elegans Rosea	" 24	22	"
" " Atropurpurea	" 9	12	"
" " Alba	" 14	18	"

Of the ninety-three different annual flowering plants under test, fifty-three gave excellent results in bloom and foliage.

SIDNEY.

Annual Flowering Plants: Seeds sown in position where plants grew on April 29 under field conditions. Plants did not receive any water. All plants bloomed until late in October.

Name or description.	Date of Blooming.	Height.	Merit.
		Inches.	
Acroclinium, Double Rose	June 28	22	Special Merit.
Alyssum, Little Dorrit	" 18	4	Special Merit.
Bartonia aurea	" 26	24	Special Merit.
Calendula officinalis, Lemon	July 2	12	Special Merit.
Calendula officinalis, Orange	" 6	12	Special Merit.
Candytuft, Improved Carmine	" 8	12	Special Merit.
Centranthus Macrosiphon	" 13	18	Ordinary.
Clarkia elegans, Brilliaat	" 6	26	Special Merit.
Centaurea Cyanus	June 28	32	Special Merit.
Centaurea Cyanus, Blue	" 6	24	Special Merit.
Chrysanthemum, Morning Star	July 6	15	Ordinary.
Chrysanthemum, Northern Star	" 6	12	Ordinary.
Eschscholtzia, Mixed	June 26	18	Very free flowering.
Gypsophila elegans	" 21	18	Useful.
Godetia, Mixed	July 17	12	Ordinary.
Godetia, Bridesmaid	" 20	15	Special Merit.
Godetia, Double Crimson	" 20	24	Ordinary.
Jacobaea, Mixed Colours	" 10	12	Ordinary.
Lavatera rosea splendens	" 20	24	Special Merit.
Lupinus, Mixed	" 6	27	Special Merit.
Larkspur, Rosy Scarlet	" 10	42	Special Merit.
Larkspur, White	" 17	42	Special Merit.
Larkspur, Blue	" 26	42	Special Merit.
Leptosiphon hybridus	June 6	18	Ordinary.
Linum grandiflorum	" 28	9	Special Merit.
Mignonette, Sweet Buff	July 10	12	Ordinary.
Malope, Mixed	" 26	12	Special Merit.
Nasturtium, Tom Thumb	" 2	10	Ordinary.
Nasturtium, Tom Thumb Veitch	" 6	10	Ordinary.
Nasturtium, Tom Thumb Brilliant	" 2	10	Ordinary.
Nasturtium, Tall Scarlet	" 2	36	Ordinary.
Nasturtium, Tall Crimson	" 4	36	Ordinary
Nasturtium, Tall Yellow & Crimson	June 28	36	Ordinary.
Nasturtium, Tall Pearl	" 28	36	Ordinary.
Nasturtium, Tall Fairy Queea	" 28	36	Ordinary.
Nasturtium, Tall Salmon	July 6	36	Ordinary.
Poppy, Double Carnation	" 13	33	Special Merit.
Poppy, Shirley	" 6	20	Special Merit.
Sweet Sultan, Giant Mixed	" 8	24	Special Merit.
Sweet Sultan, mixed	" 13	28	Special Merit.
Viscaria cardinalis	" 20	12	Ordinary.

SIDNEY.

SWEET PEAS.

Name.	Date of Sowing.	Date of Blooming	Colour.	Length of stem.	Number of blooms per stem.	Merit.
King White	April 12	July 16	White	Long	3	Very good.
Illuminator	" 12	" 13	Rosy salmon	Long	3	Good.
Lilian	" 12	" 13	Flesh pink	Long	3	Very good.
Decorator	" 12	" 6	Rose pink	Medium	3	Sunscalds.
Wedgewood	" 12	" 13	Blue	Long	3	Very good.
Thomas Stevenson	" 12	" 13	Light pink	Long	3	Sunscalds.
Queen of Norway	" 12	" 13	Mauve	Long	4	Sunscalds.
Hercules	" 12	" 13	Pink	Long	3 to 4	Very good.
Elfrida Pearson	" 12	" 13	Flesh pink	Long	4	Very good.
Edrom Beauty	" 12	" 13	Orange salmon	Long	3 to 4	Good.
Maud Holmes	" 12	" 8	Scarlet	Long	3	Very good.
Empress Eugenie	" 12	" 13	Lavender	Medium	3	Good.
White Queen	" 12	" 13	White	Long	3	Very good.
Nubian	" 12	" 13	Purple	Long	3 to 4	Good.
Scarlet Emperor	" 12	" 13	Scarlet	Long	3	Very good.
Rosabelle	" 12	" 6	Deep pink	Long	3 to 4	Good.
John Ingman	" 12	" 13	Red	Long	3 to 4	Good.
Flora Norton Spencer	" 12	" 13	Pale Blue	Long	3	Very good.
Mrs. Routzahn	" 12	" 13	Apricot	Long	3 to 4	Good.
Agricola	" 12	" 20	Rose lilac	Long	3 to 4	Very good.
Zarina	" 12	" 13	Deep pink	Medium	3	Good.
Miss Willmott	" 12	" 13	Salmon pink	Medium	3	Sunscalds.
Lady Grisel Hamilton	" 12	" 13	Pale mauve	Medium	2 to 3	Good.
Helen Pierce	" 12	" 13	Blue	Medium	3	Very good.
Black Knight	" 12	" 18	Dark maroon	Medium	2 to 3	Good.
Dorothy Eckford	" 12	" 26	White	Medium	3	Good.
Jeannie Gordon	" 12	" 20	Cream rose	Long	3	Very good.
Mrs. Collier	" 12	" 26	Cream	Long	3	Very good.
Mrs. W. Wright	" 12	" 26	Purple	Medium	3	Very good.
Prima Donna	" 12	" 26	Flesh pink	Long	3	Good.
Queen Alexandra	" 12	" 13	Scarlet	Long	3	Very good.
Rose du Barri	" 12	" 13	Rose	Medium	3	Sunscalds.
Nora Unwin	" 12	" 19	White	Medium	3	Good.
Mrs. W. J. Unwin	" 12	" 13	White & scarlet	Long	3	Very good.
Mrs. A. Ireland	" 12	" 20	Pink & cream	Medium	2–3	Very good.
Asta Ohn	" 12	" 20	Pink	Long	3	Very good.
Charles Foster	" 12	" 17	Mauve & pink	Long	4	Very good.
Countess Spencer	" 12	" 13	Pink	Long	3	Very good.
Helen Grosvenor	" 12	" 13	Orange pink	Long	3	Sunscalds.
Lady Evelyn Eyre	" 12	" 13	Pale pink	Long	4	Very good.
Florence Nightingale	" 12	" 20	Lavender	Medium	3	Good.
Etta Dyke	" 12	" 13	White	Long	4	Very good.
Elsie Herbert	" 12	" 13	White & pink	Long	3–4	Good.
Clara Curtis	" 12	" 20	Cream	Long	3	Very good.
Mrs. Cuthbertson	" 12	" 31	Deep rose	Long	3	Very fair.
Mrs. C. W. Breadmore	" 12	" 20	Cream & rose	Long	3	Good.
Tennant Spencer	" 12	" 18	Purple	Medium	3	Sunscalds.
Cerise Spencer	" 12	" 16	Deep pink	Long	3	Very good.
Helen C. Stapleton	" 12	" 20	Pink	Long	3–4	Very good.
Edith Taylor	" 12	" 15	Pink to rose	Long	3	Good.
Princess Mary	" 12	" 15	Light blue	Long	3	Very good.
Robert Sydenham	" 12	" 8	Salmon	Long	3–4	Sunscalds.
America Spencer	" 12	" 15	White & scarlet	Long	3	Very good.
Irish Belle	" 12	" 13	Mauve	Long	3–4	Very good.
Hugh Dickson	" 12	" 13	Pink	Long	3–4	Very good.
Dainty Spencer	" 12	" 17	Cream	Long	3	Good.
Queen Victoria	" 12	" 13	White	Long	3	Good

SIDNEY.

SWEET PEAS.—*Continued.*

Name.	Date of Sowing.	Date of Blooming.	Colour.	Number of blooms per truss.	Merit.
Stirling Stent	April 12	July 13	Salmon pink	3	Sunscalds.
Vermilion Brilliant	" 12	" 6	Vermilion	3	Sunscalds.
Orchid	" 12	" 13	Purple	3	Good.
Captivation Spencer	" 12	" 26	Purple	3	Good.
Helen Lewis	" 12	" 18	Salmon	3	Sunscalds.
King Edward	" 12	" 20	Red	3	Good.
Ethel Roosevelt	" 12	" 17	White & purple	3-4	Very good.
Lady Evelyn Eyre	" 12	" 13	Pale pink	3	Good.

Of the sixty-five varieties of sweet peas, ten sunscalded to such a degree as to make them useless in an exposed bright position. They would be useful in north exposures. Twenty-nine of the varieties gave bloom that we could class as very good while twenty-three varieties graded good. The peas were grown on brush supports, in open field and without water. All varieties seeded freely and produced seeds of high quality.

ARBORETUM.

The arboretum established in 1913 has made very satisfactory growth during the past season. The system of tillage has been one of horse cultivation and hand hoeing. The Kimball cultivator was used successfully throughout the season.

The following trees and shrubs were secured from various sources and added to the arboretum during the spring of 1915. The great majority of these plants established themselves and made satisfactory growth. A number of the following shrubs bloomed twice during the season:—

Andromeda paniculata.
" *axillaris.*
Ardisia crispa.
" *japonica.*
Aucuba japonicd viridis.
" *japonica.*
Aesculus Hippocastanum.
Acer macrophyllum.
" *saccharinum (dasycarpum).*
" *reticulatum.*
" *trifidum.*
Amelanchier cretica.
Abies Apollinis.
" *brachyphylla.*
" *concolor.*
" *grandis.*
" *nobilis glauca.*
" *Nordmanniana.*
Baccharis patagonica.
Betula occidentalis.
Buddleia variabilis.
" *intermedia.*
" *Lindleyana.*
" *variabilis magnifica.*
" " *Veitchiana.*
" " *superba.*
" *Davidii.*
Cercis Siliquastrum rubrum.
Carpinus orientalis.
Chloranthus brochystachys.
Cephalotaxus Fortunei.
" *drupacea.*
" *pedunculata.*
Cupressus Lawsoniana argentea.
" " *Allumi.*
" " *albo spica.*
" " *aurea nova.*
" " *elegantissima.*
" " *filiformis elegans.*
" " *gracilis.*
" " *globosa filiformis.*
" " *Hollandii.*
" " *Fraseri.*
" " *lutescens.*
" " *lycopodioides.*
" " *minima glauca.*
" " *monumentalis.*
" " *plumosus nidifera nana.*
" " *pyramidalis alba.*
" " *Rosenthali.*
" " *schongoriensis.*
" " *stricta caerulea.*
" " " *viridis.*
Cedrus atlantica.
" *Libani.*
" *Deodara.*
Caryopteris mastachanthus.
Catalpa syringaefolia.
" *specciosa.*
Cleyera japonica.
Cercidiphyllum japonicum.
Corylopsis spicata.
Camellia Sasanqua Fukuzutsumi.
" " *Onigoromo.*
" " *Azuma-nishiki.*

SIDNEY.

ARBORETUM.—*Continued.*

Coronilla emeroides.
Ceanothus Arnoldi.
" *Indigo.*
Cytisus nigricans Carlieri.
" *praecox alba.*
" *scoparius andreanus.*
" *trifolius.*
" *hirsutus.*
Dapniphyllum glaucescens.
Deutzia gracilis eximia.
" " *venusta.*
" *Lemoinei Avalanche.*
" *corymbiflora.*
" *Watereri.*
" *crenata flore roseo pleno.*
" " *candidissima pleno.*
" *Fortunei.*
" *discolor floribunda.*
" " *laotea.*
" " *arcuta.*
" " *densiflora.*
" " *grandiflora.*
" *scabra Thunbergii.*
" " *crenota.*
" *kalmiaeflora.*
" Pride of Rochester.
Dendropanax japonicus.
Daphne Mezereum rubrum.
" *Laureola.*
" *odora.*
Desmodium Dilleni.
Escallonia Philippeona.
Eriobotrya japonica.
" " *Tanakae.*
Euonymus japonicus compactus.
" " Duc d'Anjou.
" " President Gauthier.
" " *pyramidalis.*
Enkianthus japonicus.
Forsythia viridissima.
Fatsia japonica.
Fagus sylvatica.
Ginkgo biloba.
Genista germanica.
" *tinctoria.*
Helwingia rusciflora.
Hypericum patulum.
" " *Henryi.*
Hamamelis japonica.
Hibiscus syriacus pompon rouge.
" " *paeoniaeflorus.*
" " *purpureus follis variegatis.*
" " *roseus plenus.*
" " *ranunculiflorus plenus.*
" " *puniceus plenus.*
" " *bicolor hybridus.*
" *syriacus rubis.*
" " de la Reine.
" " *carneus plenus.*
" " *Ardens.*
" " *anemonaeflorus.*
Itea virginica.
Indigofera dosua.
Ilex crenata.
" *corallina.*
Jasminum revolutum.
" *nudiflorum.*
" *primulinum.*
Juglans regia.
Kerria japonica.
Kalmia latifolia.
" *angustifolia.*
Liriodendron tulipifera.
Laburnum vulgare.
" " *Adami.*
Larix leptolepis.
Lycium europaeum.
Lindera sericea.
" *triloba.*
Leycesteria formosa.
Lonicera tatarica.
Lespedeza Sieboldii.
" *cyrtobotrya.*
" *bicolor.*
Ligustrum Quihoui.
Magnolia conspicua.
" *hypoleuca.*
" *longifolia.*
" *stellata.*
" *stellata rosea.*
" *parviflora.*
" *salicifolia.*
Michelia fuscata.
Nuttallia cerasiformis.
Picea pungens.
" " *Kosteriana glauca.*
Pieris ovalifolia lanceolata.
Prunus (Laurus) Laurocerasus compacta
" " " *angustifolia.*
" " " *myrtifolia.*
" " " *schipkaensis Zabeliana.*
" " " *schipkaensis mischeana.*
" " " *lusitanica.*
" " *nobilis.*
Prunus Pseudo-cerasus Mt. Fuji.
" " " *Sekizan.*
" " " *Asahi-botan*
" *persica.*
" " double white.
Prunus emarginata.
Platanus orientalis.
Pyrus japonica alba.
" " *Moerloosi.*
" " *Columbia.*
" *Cydonia.*
" *coronaria.*
" *cerasifera coccinea.*
" *Michauxii.*
" *Pollveria.*
" *japonica.*
" " *Sargentii.*
" " *Gaujardii.*
" " *Aurora.*
Podocarpus Nageia.
" " *varicgata.*
" " *macrophylla.*
Potentilla Veitchii.
Philadelphus coronarius.
" *primulaeflorus.*
" *Satsumi.*
" *rosaeflorus plenus.*
" *satzmannii.*
" *multiflorus plenus*
" *purpureus maculata.*
" *fimbriatus.*
" *dianthaeflorus plenus*
" *nepalensis.*
" " *variegata.*
" *Magdalenae.*
" *Falconeri.*
" Souvenir de Billard.
" *Zeyheri.*
" *nivalis.*
" *grandiflorus.*
" *Gordonianus.*
" *Lemoinei Bouquet blanc.*
Pinus koraiensis.
" *Torreyana.*
" *sabiniana.*

ARBORETUM.—*Continued.*

Pinus, Coulteri.
" *ponderosa.*
" *Jeffreyi.*
" *Ayacahuite.*
" *Parryana.*
" *densiflora Tanyosho.*
" *radiata.*
" *Massoniana.*
Photinia glabra rubens.
Ptelea trifoliata.
Quercus pubescens
Rosa rubrifolia.
Rhus semialata.
Rubus rosifolius coronarius.
" *nutkanus*
" *strigosus.*
" *spectabilis.*
" *trifidus.*
" *incisus.*
" *sorbifolius.*
Ribes divaricatum
" *sanguincum.*
" *Lobbii.*
Rhododendron Oreodoxa.
" *Sutchuenense.*
" *Hunnewellianum.*
" *Davidsonianum.*
" *lutescens.*
" *Augustinii.*
" *Xanthinum.*
" *ombiguum.*
" *Polylepsis.*
" *indicum variegata ignescens.*
" *longistylum.*
" *pachytrictum*
" *Websterianum.*
" *Searsiae.*
" *Polyepia.*
" *strigillosum.*
" Alexandre Adie.
" Blandyanum.
" Leonidas
" William Gladstone.
" Commander.
" *Everestianum.*
" Minnie.
Rhododendron Prince Camille de Rohan.
" *Sherwoodianum.*
" *Jacksoni Speciosum.*
" Princess Mary.
" Lady Armstrong
" Madam Masson.
" *Onslovianum.*
" Madam Cachet.
" Michael Waterer.
" *Roseum Magnum.*
" Boule de Neige.
" Madam Rosenthal.
" Madam Wagner.
Pyrus Aucuparia.
Staphylea colchica.
Sambucus callicarpa.
Spartium junceum.
Spiraea discolor ariaefolia.
" *Van Houttei.*
Stuartia Pseudo-camellia.
Styrax Veitchiorum.
" *Obassia.*
" *japonica.*
Syringa vulgaris de Saussure.
" *villosa.*
Sequoia sempervirens
" *gigantea.*
Stephanandra flexuosa.
" *Tanakae.*
Symphoricarpus racemosa.
Skimmia japonica.
Ternstroemia japonica.
Thuya plicata.
Tamarix indica.
Trochodendron aroloides.
Torreya nucifera.
Taxus cuspidata.
" *tardiva.*
Taxodium sempervirens.
" *distichum.*
Viburnum plicatum.
" *plicata tomentosum.*
" *hupehense.*
Vitex Agnus-castus.
Zanthoxylum piperitum.
" *stenophyllum.*

LANDSCAPE DEVELOPMENT.

The scheme of park drives has been much changed. The débris has been removed from the forest portion of the park and a number of plantations made. Curbings of cement to protect the flower border on the bridge were constructed. The roadways have in part been curbed with one by six fir lumber. Two large flower beds, for bulb and flowering annuals, were made. A beginning was made in rustic picnic equipment for the park.

Planting on East Border:
Acer trifidum.
Albizzia Julibrissin.
Alnus firma.
Alnus maritima.
Andromeda japonica.
Bignonia capreolata
Buxus japonica.
Cedrela sinensis.
Celastrus articulatus
Japanese Cherry Ariake.
Cherry Yoshino.
Cinnamomum Camphora.
" *Laureiri*
Cleyera japonica.
Cornus macrophylla.
Daphniphyllum glaucescens.
Diospyros Kaki.
Elaeagnus pungens.
" *longipes.*
Euonymus alatus.
" *radicans.*
" *radicans variegata.*
Euscaphis staphyleoides.
Hamamelis japonica.
Hydrangea (collection).
Ilex integra.
" *crenata.*
" *latifolia.*
Illicium religiosum.

SIDNEY.

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LANDSCAPE DEVELOPMENT.—*Continued.*

Park Border:
Actinidia Kolomikta.
Buddleia (collection).
Photinia glabra.
" " *rubens.*
Eurya japonica.
Corylopsis spicata.
Enkianthus japonicus.
Cercis chinensis.
Stephanandra flexuosa.
" *Tanakae.*
Rubus incisus.
" *trifidus.*
Nandina domestica
Pittosporum Tobira.
Fatsia japonica.
Dendropanax.
Japanese Maple (collection).
Spiraea ariaefolia
" *sanguineum.*
Ribes sanguineum.
Cornus Nuttallii.
Philadelphus.
Barberis Aquifolium.

Banks of Pond—North of Bridge:
Delphinum (collection).
Cornus florida.
Kalmia latifolia.
Digitalis (collection).
Hydrangea (group)
Iris germanica.
Magnolia (collection).
Iris Kaempferi.
Sambucus nigra (variety).
Hypericum patulum
" *chinense*
Digitalis (collection).
Bambusa (in variety).
Phyllostachys (in variety).
Arundinaria.

Banks of Pond—South of Bridge:
Hydrangea hortensis (collection).
Bignonia (collection).
Wistaria.
Celastrus.
Schizophragma.
Clematis.
Berchemia.
Citrebia.
Kerria japonica flore pleno.
Caryopteris mastacanthus
Rhododendron (collection).
Ilex Sieboldii.
Illicium religiosum.
Ligustrum ciliatum.
" *Ibota.*
" *medium.*
Magnolia compressa.
" *compacta.*
" *fuscata.*
Myrica rubra.
Olea fragrans.
" *Aquifolium*
Paulownia imperialis.
Prunus Pseudo-cerasus Niyakt.
" " " *Ojochin.*
" " " *Hosokawabent.*
" " " *Ukon.*
" " " *Mikuruma-gayeshi.*
" " " *Ama-no-gawa.*
" " " *Sekizan.*
" " " *Mount Fuji.*
" " " *Asahi-botan.*
" " " *Ko-fugen.*
Pyrus sinensis.
Rubus sorbifolius.
Sterculia.
Teeoma grandiflora.

PROPAGATION FROM CUTTINGS.

Cuttings from one hundred and four varieties of trees, shrubs, roses, and climbing plants were taken and propagated with success. All cuttings were taken during July and started in frames. An idea may be gleaned from the results relative to the ease or difficulty of propagation of the various species.

Name of Plant.	No. propagated.	No. alive.
Ampelopsis Veitchii	13	12
Buddleia Davidii	25	24
" *magnifica*	25	23
" *Lindleyana*	25	23
" *Veitchiana*	25	21
" *variabilis superba*	25	18
Caryopteris Mastaehanthus	25	22
Cytisus purpureus albus	25	16
Ceanothus americana	25	21
" *Arnoldii*	25	23
" *Indigo*	25	7
" *Albert Pittet*	25	20
" *Gloire de Versailles*	25	25
" *Gloire de Plantiéres*	25	24
" *Marie Simon*	25	14
Cytisus schipkaensis	25	14
Crypomeria aya sugi	12	8
Daphne odora pink	25	23
" *Genkwa*	25	6
" *odora alba*	25	23
Exochorda Albertii	25	9
Euonymus Japonica variegatus	25	24
" *campoctus argenteus*	25	25
" *masculata aurea*	25	21
Escallonia rubra	25	22
" *montevidensis*	25	19
" *rosea*	25	20
" *philippiana*	25	20
Fuchsia gracilis	50	39
" *Riccartoni*	25	18
Ficus Carica	6	6
Genista Anxantica	25	8
" *scoparia Andreana*	25	5
Hydrangea cinerea sterilis	25	6
" *Ornement*	15	3
Hedera dentata variegata	25	17
" *maculata major*	25	19
Hydrangea Bretschneideri	12	0
" *Rosthorni*	13	3
Idesia polycarpa	12	1
Prunus (Laurus) Laurocerasus compacta	10	9
" " *Nobilis*	7	7
" " *Laurocerasus angustifolia*	12	6
" " *lusitanica myrtifolia*	12	8
" " *Laurocerasus rotundifolia*	12	11
" " *Laurocerasus Brunanti*	12	3
" " *Laurocerasus camellinefolia*	12	9
" " *Laurocerasus colchica*	12	4
" " *Laurocerasus Bernardi*	12	12
" " *Laurocerasus Triomphe de Bordeaux*	12	8
" " *Laurocerasus pyramidalis*	12	8
Prunus (Laurus) Laurocerasus caucasica	12	8
" " *Laurocerasus schipkaensis Mischeana*	12	12
" " *Laurocerasus latifolia Bertini*	12	7
" " *Laurocerasus Otini*	12	12
Prunus Laurocerasus schipkaensis Zabeliana	12	11
Prunus Laurocerasus schipkaensis	12	4
" " *serbica*	12	8
Lonicera nitida	185	181
" *hispidula*	13	1
" *Albertii*	25	25
Lavendula Vera	25	25
Rosa wichuraiana	25	20
Rose, Mrs. John Laing	6	1
" Souvenir de Pierre Notting	6	3
" Mrs. R. G. S. Crawford	6	0
" General Jacqueminot	6	5
" Caroline Testout	6	4
" Frau Karl Druschki	6	0
" Viscountess Folkstone	6	1
" Kaiserin Augusta Victoria	6	1
" Alfred Colomb	6	2
" Ulrich Brunner	6	5
" Climbing La France	12	8
" Chromatella	12	12
" Devoniensis	12	8
" Fortunes double yellow	12	10
" James Sprunt	12	12
" William Allen Richardson	12	10
" Alister Stella Gray	12	12
" Fanny Stolwerck	12	12
" Zella Pradel	12	12
" Perle des Neiges	12	5
" Alberic Barbier	12	1
" Russells Cottage	12	9
" Birdie Blye	12	5
" Christine Wright	12	0
" Empress of China	12	11
" Gainsborough	12	2
Sambucus nigra foliis aureis	25	23
Tamarix hispida aestivalis	13	12
" germanica vera	25	15
" gallica	25	12
" easpica	25	0
" odessana	25	16
" parviflora	25	19
" japonica plumosa	25	11
" africana	25	20
" tetandra purpurea	25	4
" juniperina	25	9
" indica	25	7
Vaccinium caespitosum	25	7
Viburnum Tinus (Laurestinus)	25	24

SIDNEY.

Seeds of the following plants were secured and sown in frames on June 26, all germinated and those that are marked X have been transplanted into nursery row. The unstarred plants are wintering in the frames. Some sixty-seven other varieties of plant seeds planted at the same time failed to germinate.

x *Acacia Armata.*
" *podalyriaefolia.*
x " *saligna.*
x " *cultriformis.*
x " *pycnantha.*
" *cyanophylla.*
" *mollissima.*
" *Cyclops.*
" *lenifolia.*
x " *melanoxylon.*
x " *latifolia.*
" *elata.*
x " *lophantha.*
x " *floribunda.*
" *Baileyana.*
x " *dealbata.*
" *verticillata.*
x *Angophora lanecolata.*
Ampelopsis quinquefolia.
x *Buddleia variabilis.*
" *superba.*
" *variabilis Veitchiana.*
x " " *magnifica.*
x *Cytisus nigricans Carlieri.*
x " *nigricans.*
x " *hirsutus.*
x *Casuarina californica.*
x " *stricta.*
x " *quadrivalis.*
x " *equisetifolia.*
x *Ceratonia Siliqua.*
x *Cassia tomentosa.*
x " *artemisioides.*
Chamaerops humilis.
Cocos Alphonsii.
Callitris robusta.
Desmodium Dilleni.
x *Erythrina crista galli.*
x *Eucalyptus leucoxylon.*
x " *calophylla.*
x " *capitellata.*
x *Eucalyptus tereticornis.*
x " *creba.*
x " *amygdalina.*
x " *botryoides.*
x " *bosistoana.*
x " *amplifolia.*
x " *globulus.*
x " *citriodora.*
x " *diversicolor.*
x " *Stuartiana.*
x *Guara* Strawberry.
x *Grevillea robusta.*
x *Genista scoparia.*
" *scoparia Andreana.*
x " *tinctoria.*
Juglans regia.
x *Laburnum vulgare.*
x *Umbellularia californica.*
Ulex europaeus.
x *Wigandia macrophylla.*
x *Weigelia Van Houttei.*
x " *Cameleon.*
" *arborea grandiflora.*
x " *Verschaffelti.*
Skimmia japonica.
Ternstroemia japonica.
Thuya plicata.
Tamarix indica.
Trochodendron aralioides.
Torreya nucifera.
Taxus cuspidata.
" *tardiva.*
Taxodium sempervirens.
" *distichum.*
Viburnum plicatum.
" *plicatum tomentosum.*
" *hupehense.*
Vitex Agnus-castus.
Zanthoxylum piperitum.
" *stenophyllum.*

SIDNEY.

CLIMBING ROSES.

TEST of Varieties, hardiness and mildew resistance. Planted, 1914.

Name.	Description.	Wintered.	Season's growth.	Condition.	Mildew.	Began to bloom.	Full bloom.	Bloom over.
			Inches.					
Climbing Meteor	Dark velvety crimson	Well	54	Medium	Large amount	July 13	July 22	Oct. 18
Wonderful Blue	Violet blue	Well	84	Good	Free	June 1	June 9	July 6
Climbing Killarney	Deep bright pink	Well	66	Good	Large amount	May 14	June 1	July 28
Climbing Mad. Jules Grolez	Satin rose, large hips	Medium	28	Good	Small amount	June 2	June 9	Sept 30
Climbing Wootton	Bright red to crimson	Well	72	Good	Free	April 28	May 17	Sept. 30
Climbing La France	Large silvery pink	Well	90	Good	Small amount	May 5	May 25	Nov. 30
Climbing Lady Godiva	Pink and white	Well	108	Good	Free	June 24	July 6	Dec. 31
Climbing Clotilde Soupert	Creamy white to pink	Medium	96	Good	Medium amount	May 17	June 1	Jan. 31
Climbing Baby Rambler	Clear red	Well	84	Good	Large amount	Sept. 10	Sept. 17	Sept. 30
Climbing Helen Gould	Dark pink to crimson	Weak	12	Medium	Free			
Climbing Papa Gontier	Deep red to crimson	Medium	54	Good	Medium amount	May 10	May 25	Oct. 16
Climbing Lily Ito	White suffused pink	Well	120	Good	Free	June 2	June 9	July 2
America	Pink to yellow	Well	60	Good	Large amount	May 1	May 25	June 18
Beauty of Glazenwood	Golden yellow	Well	54	Good	Free			
Caroline Goodrich	Rich glossy crimson	Well	12	Medium	Free			
Celine Forestier	Canary yellow	Well	48	Good	Free			
Chromatella	Sulphur yellow	Well	84	Good	Free	May 7	May 14	May 26
Claire Carnot	Deep yellow	Well	96	Good	Free			
Climbing Devoniensis	Creamy white	Well	48	Good	Free	May 15	May 26	Aug. 9
Minnehaha	Pink	Well	144	Good	Large amount	May 17	July 6	Dec. 31
Dorothy Perkins	Shell pink	Well	96	Good	Large amount	June 24	July 13	Dec. 31
Alberic Barbier	Creamy yellow	Well	96	Good	Free	May 25	June 4	Oct. 9
Keystone	Deep yellow	Well	54	Good	Free	June 24	July 6	Dec. 31
Lady Gay	Cherry pink	Well	180	Good	Free	June 7	June 24	Nov. 30
Thousand Beauties	White to pink	Well	48	Good	Free	May 25	June 2	July 24
Dawson	Pale rose	Well	84	Good	Free	June 10	June 17	July 24
La Fiamma	Red and white	Well	96	Good	Free	June 7	June 17	July 13
Leutchstern	White to pink	Well	84	Good	Small amount	May 25	June 2	Nov. 2
Multiflora	Pure white	Well	84	Good	Large amount	May 17	May 26	June 24
Superba	Rosy pink	Well	108	Good	Free	June 7	July 6	July 15
Tennessee Belle	Rosy red	Well	108	Good	Free	May 25	June 9	July 28
Triumphant	Velvety rose	Well	78	Good	Free	May 20	June 2	Nov. 30
Newport Fairy	Pink single	Well	60	Good	Medium amount	May 17	May 26	June 24
Greville	White to red	Well	60	Good	Medium amount	April 28	June 9	Nov. 30
Hiawatha	Crimson	Well	90	Good	Medium amount	June 14	June 24	Aug. 17

SIDNEY.

Northern Light	Pink and white	Well	108	Good	Free	June 5	June 17	Aug. 9
Cecile Brunner	Pink	Well	72	Good	Free	May 7	May 17	Nov. 3
Elie Beauvilian	Salmon pink	Winter-killed						
Fanny Stolwerek	Rose, tinged yellow	Well	77	Good	Free	May 1	May 25	Oct. 26
Madam Wagram	Satin rose color	Well	60	Good	Free	May 10	May 14	May 25
Pillar of Gold	Rosy pink	Well	24	Good	Medium amount	June 1	June 7	Oct. 18
Reine Marie Henriette	Deep red	Well	48	Good	Small amount	July 16	July 23	Oct. 18
White Marechal Niel	White	Killed						
Zepherin Drouat	Bright rose	Well	24	Good	Small amount	May 20	June 2	Sept. 9
Philadelphia Crimson Rambler	Deep red	Well	72	Good	Large amount	July 28		Aug. 9
Yellow Rambler	Rich yellow	Medium	90	Good	Free	July 2	July 9	July 24
White Rambler	White	Medium	72	Good	Small amount	May 20	May 26	June 9
Pink Rambler	Pink to red	Well	144	Good	Medium amount	May 17	May 26	July 6
Climbing Mosella	Lemon white	Killed						
Crimson Rambler	Crimson	Well	48	Good	Large amount	June 21	July 8	Nov. 2
Rubin	Scarlet	Well	72	Good	Medium amount	June 7	June 18	Aug. 18
Mrs. F. W. Flight	Red, white centre	Well	120	Good	Large amount	June 7	June 18	Oct. 18
Perle des Neiges	Small, canary white	Well	54	Good	Free	May 3	May 25	Oct. 30
Pink Rover	Pale pink	Well	144	Good	Free	May 18	May 26	June 24
Prairie Queen	Bright pink	Killed						
Pride of Washington	Red to light red	Medium	96	Good	Free	June 2	June 9	July 13
Pysche	White, suffused pink and yellow	Well	48	Good	Free	May 20	June 9	Dec. 31
Russels Cottage	Silver to dark red	Well	84	Good	Free	May 10	May 22	July 2
Faunus Blumschen	Bright red	Well	108	Good	Medium amount	June 14	July 6	July 15
Frier	Pale red to white	Medium	108	Good	Free	May 26	June 2	Aug. 9
White Maman Cochet	White, tinged red	Well	60	Good	Free	June 4	June 10	June 18
American Pillar	Deep pink	Well	180	Good	Small amount	May 31	June 9	July 24
Baltimore Belle	Red to white, double	Well	156	Good	Free	June 9	June 18	Aug. 17
Birdie Blye	Rose pink	Well	72	Good	Free	May 20	June 2	Dec. 31
Climbing White Pet	White	Well	72	Good	Free	July 28	Aug. 9	Aug. 24
Christine Wright	Deep flesh pink	Well	108	Good	Small amount	May 26	June 2	July 28
Empress of China	Dark red to pink	Well	120	Good	Free	April 26	May 17	Dec. 31
Gainsborough	Large silvery pink	Well	96	Good	Small amount	May 6	May 26	July 9
White Dorothy	White	Well	168	Good	Small amount	June 18	July 6	Aug. 9
Excelsa	Deep red	Well	132	Good	Medium amount	June 21	July 6	Nov. 30
Leonie Lamesch	Red to yellow	Well	22	Medium	Free	April 26	May 26	June 24
Washington	Pure white	Well	36	Good	Free	May 9	June 24	Nov. 30
Fortunes double yellow	Orange yellow	Well	96	Good	Free	May 5	May 17	June 2
Zelio Pradel	Pure white	Well	90	Good	Free	May 25	June 2	Nov. 3
James Sprunt	Velvety red	Well	126	Good	Free	May 28	June 9	July 29
Gold of Ophir	Bright Golden Yellow	Well	66	Good	Free	May 26	June 9	Nov. 13
Marechal Niel	Yellow	Well	24	Good	Free	May 14	May 25	Jan. 31
Caroline Kuster	Orange Yellow	Well	72	Good	Free	May 1	May 14	Dec. 31
Mary Washington	White to pink	Well	54	Good	Free	May 3	May 25	Dec. 31
Reve d'Or	Coppery buff	Well	72	Good	Small amount	June 2	June 7	Nov. 30
Reine Marie Henriette	Deep red	Well	54	Good	Free	May 5	May 14	Oct. 16
Reine Olga de Wurtemburg	Vivid red	Well	84	Good	Small amount	May 20	June 2	Aug. 9
Royal Cluster	White	Well	84	Good	Medium amount	May 25	June 9	June 24
Solfaterre	Sulphur yellow	Well	30	Medium	Free	May 25	June 2	Nov. 30
Waltham Washington	White	Well	48	Good	Free	May 31	June 7	Jan. 31

CLIMBING ROSES,—*Con.*

TEST of Varieties, hardiness and mildew resistance. Planted 1914.

Name.	Description.	Wintered.	Season's growth.	Condition.	Mildew.	Began to bloom.	Full bloom.	Bloom over.
			Inches.					
Wm. A. Richardson	Orange	Well	120	Good	Free	May 26	June 9	June 24
Alister Stella Gray	Yellow orange	Well	90	Good	Free	May 6	June 2	Aug. 17
Carmine Pillar	Rosy red	Well	60	Good	Medium amount	June 14	June 24	Sept. 10
Climbing Bridesmaid	Deep pink	Well	60	Good	Free	May 3	May 14	Oct. 16
Climbing Marie Guillot	White, tinged yellow	Well	24	Good	Free	June 6	June 10	Oct. 26

Fifty-two varieties were not affected with mildew. Thirty-two varieties were affected in various degrees with mildew. Three varieties winter-killed in this climate Five varieties failed to bloom during season 1915.

Empress of China, Birdie Blye, Keystone, Waltham Washington, Mary Washington and Clotilde Soupert were all in bloom at the New Year.

ROSES.—Test of Varieties. Planted 1914.

Name.	Height when planted.	Season's growth 1915.	Condition.	Began to bloom.	Full Bloom.	Bloom over.
	Inches.	Inches.				
Alfred Colomb	6	42	Good	May 26	June 4	Dec. 31
The Bride	6	42	Good	May 3	May 14	Nov. 2
Mrs. John Laing	6	42	Good	May 14	June 5	Nov. 30
Clio	6	85	Good	May 26	June 2	Oct. 21
Souvenir de Pierre Notting	6	39	Good	April 28	May 8	Nov. 2
Mrs. R. G. S. Crawford	6	38	Good	May 18	May 26	Nov. 30
General Jacqueminot	6	48	Good	May 14	May 26	Nov. 30
Her Majesty	6	30	Mildews badly	May 18	May 28	June 18
Caroline Testout	6	24		May 28	June 4	Oct. 21
Dean Hole	6	18	Good	May 28	June 4	Aug. 9
Frau Karl Druschki	6	32	Medium	May 10	May 26	Nov. 2
Gabriel Luizet	6	72	Good	May 18	June 2	June 28
Viscountess Folkstone	6	12	Good	May 26	June 4	Oct. 21
Kaiserin Augusta Victoria	6	24	Good	May 26	June 2	Oct. 21
Ulrich Brunner	6	52	Good	June 2	June 10	Nov. 13
Le Progres	6	14	Good	May 18	May 28	Dec. 31
Prince Camille de Rohan	6	60	Good	May 3	May 14	Dec. 31

SEED PRODUCTION.

Considerable interest has been shown throughout the district on the subject of growing vegetable, flower, and field seeds. To obtain information for Vancouver island relative to the quantity and quality of the various seeds, many plants of various sorts were permitted to seed. The seeds were harvested and prepared for next season's use. The following is a list of the plants from which high quality seed was successfully saved and indicates the possible scope of the industry for Vancouver island:—

ANNUALS.

Acroclinium roseum.
Aster Blushing Beauty.
" Exhibition Wonder.
" Enchantress.
" King White.
" Giant Comet.
" Primrose Queen.
" Rose Pink.
" Ray, Delicate pink.
" Ray, Large purple
Aretotis grandis.
Bartonia aurea.
Browallia elata.
Celosia pyramidalis.
Cockscomb, dwarf.
Centaurea Cyanus.
Coreopsis atrosanguinea.
" *cardaminaefolia.*
" red and yellow selected.
Candytuft, White Rocket.
Calendula officinalis flore pleno Lemon Queen.
Calendula officinalis flore pleno Orange King.
Dianthus superbissimus.
Dimorphotheca aurantioca hybrids.
Gypsophila elegans.
Godetia, double light pink.
Kochia trichophylla.
Lavatera rosea splendens.
Mignonette, buff.
Nasturtium, Tom Thumb, selected selfs.
Nicotiana affinis hybrids.
Nemesia, large flowered.
Pentstemon Bridgesii.
Poppy, Carnation flowered.
Schizanthus, large flowered.
Salpiglossis, large flowered.
Scabious, large flowered.
Sweet Sultan, large purple.
Sweet Pea Illuminator.
" " Maud Holmes.
" " Wedgewood.
" " Nubian.
" " Elfrida Pearson.
" " Flora Norton Spencer.
" " Ethel Roosevelt.
" " America Spencer.
" " Scarlet Emperor.
" " Lilian.
" " King White.
Tagetes signata pumila.
Zinnia elegans mixed.

SIDNEY.

PERENNIALS.

Aquilegia alpina hybrida.
" *coerulea.*
" *chrysantha.*
" *canadensis nana.*
" *flabellata alba.*
" Rose Queen.
Anemone coronaria single mixed.
" " choice selected.
" Saint Brigids.
Anchusa italica, Dropmore varieties.
Campanula grandis.
" *persicaefolia alba.*
" " " *grandiflora.*
" " *coerulea.*
" *carpatica.*
" *Medium calycanthema* single red.
" *Medium calycanthema* single white.
" *Medium calycanthema* single blue.
Coreopsis grandiflora.
Clematis integrifolia.
Dianthus deltoides glaucus.
" *barbatus* double mixed.
" " selected.
Digitalis gloxinaeflora.
" " *alba.*
Daisy, large flowered mixed.
Dracocephalum Ruyschianum.
Delphinum, choice selected.
Gaillardia, crimson and gold.
Gypsophila paniculata.
Helianthus. Daniel Dewar.
" Hoopesi.
Hesperis matronalis.
Hollyhock single red.
Helenium autumnale grandiflorum.
Lychnis chalcedonica.
Lahyrus latifolius albus.
Lupinus arboreus.
" *polyphyllus roseus.*
" " mixed.
Papaver orientale selected.
" " Queen Alexandra.
" " Princess Victoria Louise.
Polemonium himalaicum.
" " *album.*
Thalictrum aquilegifolium atropurpureum.
Wallflower Harbinger.
" Ruby Gem.
" White Dane
Tulip Artus.
" Chrysolora.
" Couleur de Cardinal.
" Cottage Maid.
" Duchesse de Parma.
" Darwin Isis.
" " Edmee.
Tulipa Greigii.
Tulip Gesneriana spathulata.
" Isabella.
" Joost Van Vondel (red).
" La Candeur.
" Rose Grisdelin.
" Sunset.
" Yellow Prince.
" " Rose.
Hyacinth Charles Dickens, blue.
" Grand Lilas.
" Gigantea.
" King of the Yellows.
" " " Blues.
" Lord Balfour.
" La Grandesse.
" Yellow Hammer.
Scilla sibirica.

SHRUBS.

Clematis florida.
Crataegus Oxyacantha flore coccinec pleno.
Crataegus Oxycantha semperflorens.
Ceanothus Indigo.
" Gloire de Plantières.
" " " Versailles.
" Albert Pittet.
" Americana.
" Arnouldi.
Genista scoparia.
Genista scoparia, Andreana.
" " *praecox alba.*
Hypericum patulum Henryi.
Malus floribunda.
" " *Scheideckeri.*
" " *flore albo pleno.*
Buddleia variabilis.
" " *Veitchiana.*
" " *magnifica.*
" " *superba.*
Platanus orientalis.

SIDNEY.

VEGETABLES.

Broccoli, Wilcoves Late White.
" June Monarch.
Beet, Early Black Red Ball.
Beans, Bountiful.
" Extra Early Valentine.
" Valentine Wax.
" Extra Early Refugee.
" Refugee or 1,000 to 1.
" Grennell Rustless Wax.
" Wardwell Kidney Wax.
" Fordhook Favourite.
" Round Pod Kidney.
" Early Red Valentine.
" Stringless Green Pod.
Carrot, Half Long Chantenay.
Cucumber, Giant Pera.
Lettuce Dreer All Heart.
" Grand Rapids.
Musk Melon, Improved Rocky Ford.
Onion, Dark Red Beauty.
" White Globe.
" Danvers Yellow Globe.
" Giant Red Wethersfield.
Pumpkin, Sweet as Sugar.
" Jumbo.
Parsley, Double Curled.
Pepper, Neapolitan.
" Long Red Cayenne.
Pea, Quite Content.
" Telephone.
" Heroine.
" Advancer.
" Dainty Duchess.
" Sutton Excelsior.
" Gradus.
" Gregory Surprise.
" Stratagem.
" Juno.
" Lincoln.
" Premium Gem.
" English Wonder.
" American Wonder.
" Thomas Laxton.
" Gradus.
Swede Turnip, Hazard Improved.
" " Carter Imperial.
Tomato, Extremely Early.
" Chalks Early Jewel
" Jack Rose.
" Florida Special.
" Prosperity.
" North Adrionack Earliana.
" Sunnybrook Strain Earliana
" Alacrity.
Water Melon, Red Citron.

REPORT OF EXPERIMENTS ON THE FRUIT FARM OF THOS. A. SHARPE, SALMON ARM, B.C.

The snow came on in the autumn of 1914 before any very severe frost was in the ground, and the snowfall for the winter of 1914 and 1915 was pretty heavy for this district. The snow melted without any rush in the spring of 1915 and was mostly all absorbed by the land, thus furnishing a moist seed bed for all seed sown. The season was moderately wet.

The fruit crop last season was on the whole a fairly good one, and prices more satisfactory than for some years past. This applies to both small and tree fruits. The trouble with apple scab, perhaps owing to the showery weather and consequent warm moist air, was a good deal more prevalent than for some time past.

A good many varieties in the experimental orchard fruited this year for the fifth year, and as quite a number of them do not appear to be of sufficient value to merit continued cultivation, a number have been budded to other promising but untested varieties, and more of this will be done as the tests call for.

A small orchard of apples and one of cherries was planted to test as a commercial venture. The trees have made a satisfactory growth and many of the cherry trees bore a small crop last summer. As the cherries from this district are about the last to come onto the market, a better price is obtained here than by growers in districts where the fruit has more competition, and it is to be hoped that more cherries will be grown on the uplands. Ten trees, five each of Olivet and De Planchoury planted in the spring of 1908 have averaged per tree, for the last four years, $3.50.

Several of the pear trees planted in the spring of 1911 bore specimens in 1915, and two varieties, the Margaret Marallat, a large October pear of good quality and a medium sized pear named Eva Baltet produced fine crops considering the age of the trees, and these varieties should prove of value in this locality. Of the better known varieties, the Anjou and Dr. Jules Guyot produced good crops and promise to be profitable here.

Plums.—Several varieties of plums new to this district fruited freely, and of these several are promising in a commercial way as the trees are vigorous growers, productive, and the fruit is of a desirable size, beauty and quality.

The most promising blackberry so far tested is the Eldorado, the canes being vigorous and productive, the fruit large, of good quality and a good shipper.

The best raspberries so far tested are the Cuthbert and Herbert. The St. Regis everbearing raspberry has also been tested, but in this district it is lacking in quality and the berry is crumbly and very uneven in size.

SALMON ARM.

SUBSTATIONS.

FORT VERMILION, PEACE RIVER DISTRICT, ALTA.

This Substation is situated in the valley of the Peace river in latitude 58° 36'. It is over three hundred miles north of Edmonton, and is in charge of Mr. Robert Jones, who has prepared the details for the following report:—

The spring of 1915 was a very fine one. The snow started to go in the latter part of March and, the thaw continuing, was all gone by April 8. The frost was out of the ground enough to plough April 12 and land was in condition for seeding by April 15, as early as it has been for many years. Trees and shrubs came through the winter well and strawberries were wintered satisfactorily. The lowest temperature in April was on the 21st when it was 16·1° F., the highest was 69·0 on the same date. There was frost on twenty-one days during the month. In May the lowest temperature was 24° on the 13th and the highest 77° on the 26th. There was frost on nine days in May. There were good rains, which caused rapid growth and on June 11 conditions were very favourable for many shrubs and herbaceous plants in flower. On June 12, there was a decided change to cooler weather. On the night of the 13th, there were 3·5° of frost; on the night of the 14th the temperature went down to 17·9° F. or 14·1° frost. Tender plants, such as tomatoes, squash, melons, cucumbers, beans, corn and many flowers were completely killed. The blossoms on all of the lilacs and other flowering shrubs were killed and foliage of trees injured. Potatoes were cut down to the ground, but recovered again though the crop was later. For all the years the writer has spent in the North, this is the severest frost that has been experienced at this time of year. Very dry weather followed the frost and berries were small. The weather was warm in July with good rains so that the hardier vegetables recovered fairly well. The lowest temperature was on the 1st, when the temperature was 36·5° F., the highest was 84·5° on the 7th. There was no rain in August from the 6th to the 29th. The highest temperature in August was 92° on the 12th and the lowest 37° on the 25th. In September there was frost on fourteen days, the lowest temperature being 14·9° on the 18th and the highest 78° on the 4th. There were fourteen and a half degrees of frost on the 15th when corn was killed.

FRUIT.

Fruit was promising until the severe frost of June. At that time the Charles apple had about one dozen apples on it; the Cheney plum also had fruit. All the fruit fell off after the frost.

APPLES UNDER TEST.

Two Alberta, two Charles, two Tony, two Prince, two Golden, two Magnus, two Silvia, two Robin, two Pioneer, one Parma, one Charlamoff, one Morden, two seedlings of Alberta, two seedlings of Golden, three seedlings of Jewel, two seedlings of Silvia.

These are the oldest trees and are doing only moderately well.

FORT VERMILION.

APPLE SEEDLINGS.

Number of small apple trees alive and doing well from seedlings planted in spring of 1914:—

22	Anis Seedlings alive and doing well, the tallest of these are		16	inches high.
25	Iowa Beauty Seedlings	"	16	"
10	Moscow Pear Apple Seedlings	"	14	"
16	Hibernal Seedlings	"	11	"
24	Patten Duchess Seedlings	"	12	"
18	Hoadley Seedlings	"	17	"
7	Lowland Raspberry Seedlings	"	14	"
17	Grandmother Seedlings	"	15	"

Out of the 170 sent, 33 have been lost. The Iowa Beauty Seedlings seem to be the hardiest of them all.

CURRANTS.

BLACK CURRANTS, Names of Varieties and Yield obtained. All picked from July 20 to 29, 1915.

No. of Bushes.		Pints
2	Bang Up	15
2	Norton	6
2	Kerry	10
2	Climax	20½
2	Topsy	17½
2	Eclipse	11
2	Magnus	14
2	Saunders	9
2	Ethel	13
2	Ontario	12
2	Eagle	6

RED CURRANTS. Names of Varieties and Yields Obtained.

No. of Bushes.		Pints.
2	Simcoe King	30
2	Rankins Red	19
2	Greenfield	52
2	Moore Seedling	35½
2	Goliath	29
2	Red Dutch	26
2	Large Red	34
2	Long Bunched Holland	18
2	Cumberland Red	23

WHITE CURRANTS, Names of Varieties and Yields obtained. All picked on July 29.

No. of Bushes.		Pints.
2	Large White	16½
2	White Grape	9
1	White Cherry	3
	One only, bush quite small.	
2	White Kaiser	12
2	White Dutch	6½
	Reported on August 16, 1915.	

RASPBERRIES.

The raspberries were picked on August 13. The yields were small on account of the June frost. Herbert yielded 3 pints of fruit, and Heebner 4 pints.

SEEDLING STRAWBERRIES.

There are a number of seedling strawberries of the following varieties growing here: Daniel Boone in bloom June 8, Beder Wood, World Wonder, Daisy in bloom June 9, Carrie, Senator Dunlap in bloom June 11. All were good strong plants.

FORT VERMILION.

VEGETABLES.

Considering the drought and cold experienced during the spring and early summer, the vegetables gave a very satisfactory yield. Although the rainfall was not heavy there was such as to ensure a fair growth on well-tilled land. Table beets and carrots were somewhat below the average. This was probably on account of the seed used being some that was left over from the spring of 1913.

PEAS, TEST OF VARIETIES.

Ten varieties of garden peas were tested this season. All were planted on April 23 to 26. Four drills of each variety were sown in rows 33 feet long and 12 inches apart. Some of the earlier varieties were just coming into bloom on June 15 when the frost occurred, the blossoms being killed as well as part of the vine. It was some time before they recovered from the effects of this setback, and, in consequence, the peas were later than usual coming into use. The peas were a medium size and of good quality.

The following are the dates when the peas were ready for use, also dates when ripe:—

Variety.	Height of plant.	Length of pod.	Ready for use.	Ripe and pulled.
	in.	in.		
Stratagem	12	3	July 19	Aug. 4
Witham Wonder	14	3¼	July 27	Aug. 5
Admiral Dewey	36	3	July 21	Aug. 12
Henderson First of All	20	2	July 16	July 31
Gradus	36	3	July 20	Aug. 2
Gregory Surprise	24	2½	July 24	Aug. 2
American Wonder	30	2¾	July 23	Aug. 10
Dwarf Telephone	14	3½	Aug. 13	July 23
Premium Gem	24	2½	July 22	Aug. 3
English Wonder	15	2¼	July 21	Aug. 5

CORN, TEST OF VARIETIES.

The past season was quite unfavourable for the growing of corn on account of the cool weather experienced during the spring. The corn had just got nicely started when it was cut down by a severe frost that occurred on the night of June 14-15, when there were 13 degrees of frost, some plots being completely killed out. What recovered from this setback did fairly well, but did not reach the usual height. All plots were cut on September 17 and 18, after another severe frost which occurred on the night of September 15, when we had 14½ degrees of frost. The weight of the varieties tested was taken while still green. None was fit for use.

The varieties of corn were planted on April 28 and 29, in hills 30 inches apart each way. The soil is a dark clay loam, which was ploughed out of hay sod in the early part of July, 1914, after the hay had been removed, and manure was applied at the rate of

about 15 tons per acre and then disced in and the harrow run over a number of times during the autumn to conserve the moisture. In the spring of 1915, this land was again lightly disced and then harrowed over with the smoothing harrow and the seed planted at once.

Variety.	Size of Plot.	Planted.	Cut.	Average height.	Condition when cut.	Remarks.
Malakoff.....	4 rows, 33 ft. long.	April 29..	Sept. 18..	24 inches.	In tassel, Aug. 6. In silk, Aug. 13.	Cobs very small and quite green.
Early Malcolm.	1 row, 33 ft. long.	April 29..	Sept. 18..	.....	In tassel, Aug. 3. In silk, Aug. 19.	Doughy.
Early Cory.....	2 rows.....	.....	Sept. 18..	.....	In tassel, Aug. 12. In silk, Aug. 21.	Cobs, just formed.

White Squaw—Completely killed by the frost in June. I did not re-seed, as it was then too late; as was also the plot that was planted with Squaw Corn seed from Colorado.

GARDEN TURNIPS, TEST OF VARIETIES.

Eight rows, 33 feet long, 24 inches apart of the following varieties of garden turnips were sown on May 5.

The land on which the turnips was grown was in summer-fallow the previous year with manure applied at the rate of twenty wagon-loads per acre before the land was ploughed. The harrow was run over the land as soon as it was ploughed, and it was kept well harrowed during the balance of the summer and autumn. The yield was calculated from these eight rows. The first was in use on July 4, and from that on throughout the summer.

Variety.	Sown.	In use.	Harvested.	Yield in pounds.	Yield per acre.	Size.	Quality.
				per plot.	tons. lb.		
Extra Early White Milan.....	May 5	July 4	Sept. 18	725	21 1500	very large	good.
Golden Ball.....	May 5	July 12	Sept. 18	450	13 1000	small....	medium.
White Stone.....	May 5	July 8	Sept. 18	582	17 920	medium..	fine and of a good flavour.

ONIONS, TEST OF VARIETIES.

White Barletta.....	April 21	June 30	Sept. 14	3 rows, each 33 ft. long. Yield 42 lbs.	medium..	fine.
Early Flat Red Wethersfield	April 19	June 30	Sept. 14	12 rows, each 33 ft. long. Yield 110 lbs.	large.....	good.
Large Red Wethersfield	April 21	June 28	Sept. 14	8 rows, each 33 ft. long... Yield 91 lbs.	medium..	good.
Danvers Yellow Globe.....	April 19	July 3	Sept. 14	6 rows, each 33 ft. long... Yield 72 lbs.	large.....	fine.

TABLE BEETS, TEST OF VARIETIES.

Early Eclipse.....	April 22	July 29	Sept. 16	3 rows, each 33 ft. long... Yield 80 lcs.	medium..	fair.
Covent Garden.....	April 19	Aug. 4	Sept. 16	3 rows, each 33 ft. long... Yield 75 lbs.	small.....	good.

CARROTS, TEST OF VARIETIES.

Extra Early Horn..	April 22	July 15	Sept. 18	6 rows, each 33 ft. long. Yield 78 lbs.	medium .	fine.
Chantenay	April 22	July 10	Sept. 18	6 rows, each 33 ft. long... Yield 81 lbs.	large.....	fair.

PARSNIP, TEST OF VARIETIES.

Variety.	Sown.	In use.	Harvested.	Size.	Quality.
Hollow Crown.....	April 22	July 30.	Sept. 18. Yield from 6 rows, each 33ft. long, 90 lbs.	large.....	Very fine.

BEANS, TEST OF VARIETIES.

Four plots of 1/60 of an acre of the following varieties of beans were planted on May 6 in hills about 2 feet apart each way: Early Red Valentine, Challenge Black Wax, Golden Wax and Black Wax. Challenge Black Wax and Early Red Valentine were completely killed out by the frost in June. A few hills of the Golden Wax and Black Wax escaped this frost and came on quite finely. Golden Wax was fit for use on August 2, and Black Wax on the 10th. These two last mentioned would have ripened but for the early frost in September, but being somewhat green when this frost occurred, they were ruined.

PARSLEY, TEST OF VARIETIES.

Variety.	Sown.	In use.	Harvested.	Size.	
Exquisite Dwarf Curled.....	April 24	July 14	Sept. 19. 2 rows each 33ft. long.....	Quite large and thick.	

LETTUCE, TEST OF VARIETIES.

Two rows each of the following varieties of lettuce were sown this spring with good results, although the lettuce was inclined to go to seed earlier than usual on account of the dry weather.

Variety.	Sown.	In use.	Quality.
Black Seeded Simpson.....	April 21....	May 31....	Very good and crisp.
Grand Rapids.....	April 21....	May 21....	Fine.
New York.....	April 21....	May 25....	Very crisp and tender.

RADISH, TEST OF VARIETIES.

Three varieties of radish were under test this season, the following being the dates of sowing and dates when fit for use. The radish also went to seed very quickly after coming into use.

Variety.	Sown.	In use.	Quality.
Scarlet White Tipped.....	April 21....	May 27....	Fine.
Rosy Gem.....	April 21....	May 31....	Good.
French Breakfast.....	April 21....	May 28....	Very fine.

CELERY, TEST OF VARIETIES.

Three varieties of celery were sown in hotbeds on April 14, and were transplanted out into trenches on June 3, one trench of each variety. The trenches were twelve inches deep and about five inches of well-rotted manure were placed in the bottom of the trench and four inches of soil on top of manure. As the plants grew, the soil was filled in and after they were above the trenches the plants were kept hilled up during the season with very good results. Each trench was 33 feet long.

Variety.	Transplanted.	In use.	Size.	Quality.	Harvested	Weight from one row.
Paris Golden Yellow	June 3	Aug. 4	large	good	Sept. 22	80 lb.
White Plume	June 3	Aug. 10	medium	very fine	Sept. 22	74 lb.
Golden Self Blanching	June 3	Aug. 14	small	good	Sept. 22	62 lb.

CABBAGE, TEST OF VARIETIES.

The following varieties of cabbage were sown in the hotbeds on April 17 to 24, as the hotbeds were got in readiness, and were transplanted out on the open ground on May 17-18. The season was rather dry for the best results.

The following are the dates when first in use and average weight per head:—

Variety.	In use.	Average weight per head.	Quality.
		lb.	
Copenhagen Market	Aug. 4	7	Very solid.
Early Paris Market	Aug. 9	6½	Fine.
Danish Ballhead	Aug. 14	7	Good.
Early Jersey Wakefield	July 20	4	Fine and of good flavour.
Red Rock	Aug. 20	7¾	Very solid.

CAULIFLOWERS, TEST OF VARIETIES.

Two varieties of cauliflower were sown in the hotbeds on April 14 and were transplanted on May 17. The heads were of medium size and a few days later than usual coming into use, but of a fine quality.

Variety.	In use.	Average weight.	Transplanted out.
		lb.	
High Grade Dwarf Erfurt	July 22	6½	May 17.
Paris	July 26	5	May 17.

ASPARAGUS.

A fine crop was again obtained this season from the old beds of Columbia White. The asparagus was in use May 20 to the end of July. It was crisp and fine and quite large.

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RHUBARB, VICTORIA.

Rhubarb was in use from May 18 until the frost in September. It was fine and very large and tender.

MISCELLANEOUS VEGETABLES.

All of the squash, melons, cucumbers and pumpkins were doing well and the vines were quite large. Some of them were in bloom when the frost occurred and the most of them were completely killed. One hill of pumpkin, Large Connecticut Field, and one hill of citron started again from the root and with careful treatment these two hills did very well, more especially the pumpkin, as on the 19th of September, fourteen large fine pumpkins were picked from this one hill, weighing 15 pounds to 30 pounds and from the one hill of citron, four quite large citrons were picked, weighing 5 pounds each.

Fifty fine large plants each of the following varieties of tomatoes were transplanted from the hotbeds on May 18. Alacrity No. 2-24-9 and Alacrity No. 16 of 1914; also Alacrity 23-13; also fifty plants Atlantic Prize, and the same number of Sparks Earliana, C.E.F. strain. All were doing well and the most of them were in bloom when the frost occurred in June. Most of them were completely destroyed. A few of them started up again from the roots but did not amount to anything. Soon after the frost in September a few very green and very small ones were picked.

POTATOES, TEST OF VARIETIES.

Five varieties of potatoes were planted on the 16th and the 19th of April in plots of one-fifteenth of an acre on land on which grain had been the previous season. Manure was applied after the grain had been harvested and the land fall ploughed.

The land was harrowed once in the autumn and well harrowed in the spring before the rows were made. The rows were 34 inches apart and the sets were placed 10 to 12 inches apart in the row.

Frequent cultivation was given during the season, with only a medium growth of tops, as the tops were badly killed back by the frost in June. It looked at one time as though we might have no potatoes whatever, but, with favourable weather after the frost, they recovered and did quite well.

The potatoes were taken up on the 11th of September. The crop was not large in total yield but in quality and size of tubers the results were quite favourable.

The following were the results obtained:—

Variety.	Planted.	In use.	When dug.	Yield from plot.	Yield per acre.	Form.	Colour.	Size.	Remarks.
				lb.	bush. lb.				
Rochester Rose....	April 17.	July 26.	Sept. 11.	1,190	297 50	Oval....	Red....	Medium	All of marketable quality.
Early Rose	April 17.	July 28.	Sept. 11.	1,460	365 ..	Oval....	Red....	Large...	This date when in use is somewhat later than usual on account of the frost.
Carman No. 1...	April 19.	Aug. 6.	Sept. 11.	1,283	304 15	Oval....	White...	Medium large.	
Gold Coin	April 19.	Aug. 2.	Sept. 11.	1,393	348 15	Oval....	White...	Large...	
Irish Cobbler....	April 19.	July 30.	Sept. 11.	1,220	305 ..	Round..	White...	Medium	

FLOWERS.

The following flowers were under test this season at this Station. The more tender varieties were sown under glass on April 14 to 17. The hardier varieties were sown in open ground from April 30 to the middle of May. The severe frost of June gave most of them a severe setback, but while a number were killed, those that escaped this frost came along nicely and produced a profusion of blooms which were much admired by the visitors to the Station. All were in bloom until the severe frost of September 18.

The following are the names of the different varieties under test, and dates when first in bloom:—

Pansies on 1-year old plants were in bloom April 17.

On the 30th of April there were transplanted from the old flower garden a number of Dianthus of the different varieties. These were in bloom from the 6th to the 14th of July and continued in bloom until well into the autumn.

Variety.	In bloom.
Antirrhinum, dwarf	July 9.
Antirrhinum, fancy mixed	" 12.
Aster, Semple's mixed	August 2.
Aster, Daybreak, mixed	" 14.
Aster, Pink Beauty	" 13.
Aster, Truffauts Paeony Flowered	" 4.
Aster, Giant Comet	" 6.
Brachycome, Swan River Daisy	July 4.
Calendula, mixed	" 1
Calliopsis, mixed	August 24.
Candytuft	June 18.
Centaurea imperialis, or Cornflower, all colours	July 21.
Celosia, killed by frost in June.	
Chrysanthemum, annual	" 28.
Clarkia	" 19.
Cosmos, only one was left after the frost	August 28.
Dimorphotheca, or South African Daisy	July 1.
Daisy, Snowball	June 30.
Eschscholtzia, mixed, California Poppy	" 3.
Lobelia tenuior	August 28.
Linum, or Flowering Flax	July 2.
Marigolds, mixed	" 4.
Marigolds, dwarf mixed	" 6.
Mignonette, finest mixed	" 17.

The three varieties of Nasturtiums were just coming in bloom when the first frost occurred in September.

Nicotiana affinis	July 14
Pansies, mixed, sown in the open-ground	May 2.
Pansies, Giant Flowered	July 12 and 15.
Phacelia	" 26.
Petunias, mixed	" 8.
Phlox Drummondii	" 2.
Abronia umbellata	August 2.
Nolana	" 2.
Poppies, Improved Shirley	July 12.
Poppies, Cardinal	" 15.
Poppies, Double	" 10.
Rudbeckia speciosa bicolor	August 9.
Rhodanthe	July 22.
Salpiglossis	" 26.
Scabiosa	August 11.
Stocks, Ten Weeks, mixed	July 12.
Stocks, Dwarf	" 14.
Verbena, mixed	" 16.
Zinnia, Improved Mammoth. All killed by the June frost.	
Helichrysum, mixed	August 4.
Schizanthus	July 2.
Arctotis	August 2.

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Sweet Peas—

Mrs. Cuthbertson	July	28.
Mrs. Hugh Dickson	"	17.
Irish Belle, or Dream	"	23.
King Edward	"	26.
Dainty Spencer	"	24.
Sweet Pea, New Burpee Blend of Re-selected Spencer	"	20.
Cupid Sweet Pea	"	16.

The following varieties of perennials were in bloom during the past season. Below are the names of each and the dates when in bloom:—

Variety.	In bloom.	
Delphinium (Larkspur)—		
Seedling Blue	June	7.
Large White	"	20.
Hybridum	"	29.
Gaillardia—		
Crimson and Gold	"	28.
Dwarf	July	2.
Dark Red Centre	"	8.
Hesperis matronalis	June	2.
Achillea Ptarmica fl. pl.	July	12.
Balsams, mixed	"	30.
Sunflowers	August	6.
Kenilworth Ivy	July	8.

Kochia or Summer Cypress made a fine showing again this summer.

In the flower garden was put some rustic work which was covered on the two sides with a wild cucumber vine, on one end with Japanese hop and on the front end with Scarlet Runner bean. It was very pretty indeed.

ORNAMENTAL SHRUBS AND TREES UNDER TEST, ENDING JUNE 12, 1915.

	Notes.
2 *Acer tataricum Ginnala* (Ginnalian maple)	Doing moderately well.
2 *Acer saccharinum (dasycarpum)* (Silver maple)	Fairly only.
4 *Acer Negundo* (Box Elder or Manitoba maple)	One tree 11 ft. 10 in. high, 1 ft. 3 in. girth. One tree 12 ft. 2 in. high, 1 ft. 9 in. girth. Doing finely.
2 *Acer pictum*	Quite good.
2 *Picea excelsa Remontii*	Doing well.
2 *Amelanchier vulgaris*	Fine.
1 *Betula alba laciniata* (Cut-leaved birch)	Good.
4 *Berberis Thunbergii*	In bloom May 28, very fine.
1 *Clematis montana*	
2 *Caragana arborescens* (Siberian pea tree)	In bloom May 20. A large number of these, all doing fine.
2 *Caragana grandiflora*	In bloom May 22, very fine.
2 *Caragana frutescens*	In bloom June 1, good.
2 *Caragana pygmaea*	In bloom June 2, good.
2 *Cotoneaster tomentosa*	In bloom June 1, good.
2 *Crataegus Arnoldiana*	Doing finely.
2 *Celtis occidentalis*	Doing finely.
1 *Euonymus linearis*	In bloom May 26, doing well.
4 *Crataegus Carrieri*	Good.
2 *Ceanothus americanus*	Very fine.
2 *Lonicena alpina*	In bloom May 20, good.
3 *Lonicera Mundeniensis*	Fine.
2 *Lonicera Fenzlei*	In bloom June 2, good.
2 *Lonicera tatarica virginalis*	In bloom June 4, fine.
2 *Lonicera Sullivantii*	In bloom June 4, fine.
2 *Delphinium*. Larkspur seedling, blue.	In bloom June 7, fine.
1 *Diervilla lutea*	Good.

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ORNAMENTAL SHRUBS AND TREES UNDER TEST., ETC.—*Continued.*

3	*Euonymus nuropaeus ovatus*	In bloom May 29, doing well.
2	*Hydrangea paniculata grandiflora*	Good.
2	*Ligustrum amurense* (Amur privet)	Good.
2	*Fraxinus pennsylvanica lanceolata* (green ash)	Good.
1	*Populus angustifolia* (poplar)	Good.
2	*Lycium europaeum* (Matrimony vine)	Good.
2	*Philadelphus Lemoinei* Mont Blanc	Moderately good.
2	*Pseudotsuga Douglasii* (Douglas fir)	Fine.
1	*Spiraea Billardii*	In bloom June 11, very fine.
2	*Quercus rubra* (Red oak)	Good.
2	*Rhamnus Frangula* (Alder buckthorn)	Good.
1	*Ribes aureum* (Missouri currant)	In bloom May 25, very fine.
2	*Cupressus (Retinospora) pisifera*	Good.
6	White birch	Good.
1	*Syringa amurensis*	Good.
1	*Syringa japonica* (Tree lilac)	Doing well.
2	Lilac, Madame Casimir Perier	Doing finely.
2	Lilac, Chas. Joly	In bloom June 8, very fine.
2	Lilac, Chas. Tenth	In bloom May 29, extra fine.
2	Lilac, Michel Buchner	Good.
2	Lilac, Emile Lemoine	In bloom June 6, very fine.
2	Lilac, Jacques Calot	Good.
6	*Syringa villosa*	In full bloom June 10, very fine, 10 ft. 3 in. high
2	Lilac, Congo	In bloom May 27, extra fine.
2	*Syringa pekinsensis*	Good.
2	Lilac, Mlle. Fernande Viger	Good.
2	*Thuya occidentalis Columbia*	Good.
2	Lilac, Mde. Abel Chatenay	Good.
1	*Spiraea arguta*	In bloom May 21, very fine.
6	*Salix Voroncsh* (Golden willow)	Good.
6	*Thuya occidentalis*	Good.
2	*Thuya occidentalis globosa*	Good.
1	*Thuya occidentalis Hoveyi*	Good.
1	Viburnum molle	Good.
1	*Syringa chinensis (Rothomagensis)*	Good.
1	Lilac (No name)	In bloom June 8, very fine.
1	*Hippophae rhamnoides* (Sea buckthorn)	Good.
1	*Rose Delicata*	Good.
1	*Rosa rugosa alba*	Good.
12	*Spiraea sorbifolia*	Very fine.
3	*Amelanchier* (June berry or Saskatoon)	In bloom May 29.

FORT VERMILION.

GROUARD, LESSER SLAVE LAKE, ALTA.

The following report was prepared by Brother Laurent, O.M.I., the mission with which he is connected having charge of the work at Grouard.

The season of 1915 was fifteen days earlier for seeding than in 1914. The work of preparing the soil commenced the first week in April and the seeding was done from the 15th to the 25th. Germination took place the week following and growth continued regularly until the end of the season.

On March 10, seed of Sparks Earliana tomato, Chalks Early Jewel, Magnus and Golden Queen tomato was sown in hotbed. All were transplanted three weeks later and finally set out in the open on June 1 and 2. On the same date seed was sown of White Plume, Paris Golden Yellow and Large Dwarf White celery, and the plants were set out in the second week of June. On April 2, seed was sown of Alacrity, Adirondack, and Sunnybrook Earliana tomato, also Cayenne pepper, the latter of which ripened some fruits. The plants from this sowing of April 2 were transplanted in hotbeds three weeks later, four inches apart, and planted outside on June 2. This last sowing suffered less from transplanting than the first.

Cabbage seed was sown April 6 in the hotbed of the varieties Paris Early Market, Early Jersey Wakefield, Danish Roundhead, Express and Etampes. The early varieties transplanted May 29 were ready for the table on June 20. The other autumn varieties transplanted to the garden on June 1 gave an excellent yield as did the cauliflowers, Early Dwarf Erfurt, Snowball and Gilt Edge.

Radishes.—Early White Tipped was the best. French Breakfast became hollow.

Lettuce.—Nonpareil and Unrivalled were excellent.

Carrots, sown April 6.—Early Short English, Half Long Chantenay and Carter Favorite all did well.

Onions, sown April 16.—Extra Early Wethersfield, Yellow Globe Danvers, Small White Barletta and White Queen were all eaten by the small white maggots.

Table Turnips, sown April 16.—Early White Milan, Snowball, Golden Ball, Carter Invicta started well but were all destroyed by the maggots.

Beets, sown April 16.—Round Red Eclipse, Dark Blood Red, Egyptian and Half Long Red. The first was the earliest ready for the table.

Garden Peas, sown April 16.—Alaska, ready on July 10. Planted May 12—Sutton Excelsior, Stratagem, Thos. Laxton, Gregory Surprise and Admiral Dewey.

Butter Beans, planted May 18.—Challenge and Valentine. Ripened August 1. The first variety is the better.

Corn, planted May 11.—Early Malcolm and Squaw. The latter variety gave some ripe ears.

Summer Squash.—Summer Crookneck, White Bush and English Vegetable Marrow all gave fine fruit but it is little appreciated here. They were sown under glass April 15 and transplanted to the garden on June 3. Large fruited squash received the same culture as the preceding and ripened well, some specimens being 30 pounds in weight.

GROUARD.

Potatoes, planted May 16 and harvested September 15.—Early Rose, Rochester Rose, Early Long Six Weeks Rose. There was no appreciable difference in the yield which was 225 bushels per acre.

The flower garden gave satisfaction as usual. There were 25 kinds of the commoner annuals and fifteen herbaceous perennials; among others, 4 varieties of German Iris which were in flower June 18.

Flowering Shrubs.—Common Lilacs in varied colours and *Syringa villosa* commenced to flower May 29 and gave a profusion of bloom during all the month of June. *Spiraea arguta* flowered early in May. *Hydrangea paniculata* flowered throughout August.

Currants and Strawberries.—Currants and strawberries gave an abundant harvest as did the large cultivated varieties of strawberries.

REPORT BY W. D. ALBRIGHT, BEAVERLODGE (GRANDE PRAIRIE), ALTA.

VEGETABLES.

Contrary to previous experience, early planting of gardens proved advantageous in most cases this year. The garden here was a partial exception, for the reason that cutworms devastated the early plantings of lettuce, onions, radishes, carrots, beets, cabbage and cauliflower. They spared, however, all but the final planting of peas, made late in May. Of the other vegetables mentioned, best results were obtained from plantings of May 4, and thereabouts. This was following a soft snowfall, unattended by frost, which favoured us about May Day. The cabbage and cauliflowers sown in the hotbed were not transplanted until well on into June, but nevertheless did well, every head forming solid, even of the late Danish Ballhead. Cucumbers, pumpkins, squash, beans and corn were mostly planted in hills with hog manure beneath, this being the freest from weed seeds of any we had. The hog manure was probably a mistake, for germination of these things was tardy and subsequent growth slow, whereas a row of Golden Bantam corn planted without manure, germinated sooner, producing an unbroken row, which eventually, when the warm weather came, responded surprisingly and when cut with frost had made a beautiful even row about three feet tall and with ears very near the boiling stage. It is probable that with more care it could have been forced to the development of usable ears. The beans, squash and pumpkins were neglected as utterly hopeless, until quite late in the season, when the few plants in sight were hoed as a matter of form. There followed a period of warm showery weather and their progress was astonishing. The one Longfield pumpkin vine formed a dozen fruits, the largest girthing 34 inches, and while not quite ripening, it was sufficiently mature to cook well for pies. The squash was the same. Summer Crookneck ripened first, though some of the English Vegetable Marrow and Scallop Bush matured sufficiently to use. All the usual winter vegetables were had in quantity, from parsley to parsnip and salsify. All, too, were of superior texture and flavour, the carrots, cabbage, cauliflower and parsnips being particularly delicious. Parsnips and salsify, with us, however, grow very fibrous branching roots, even in deep tilled soil. Four kinds of peas kept the table supplied for a month to six weeks and a mess of second crop was picked September 11. Gregory Surprise surprised us by affording a picking two or three days ahead of the excellent Gradus. Thos. Laxton and Excelsior were later. Early Paris Market was the first cabbage to mature, while of the two kinds of cauliflower, the Extra Early Dwarf Erfurt headed better than the Snowball. Eclipse, Early Model, Crosby Egyptian and Witham Fireball beets, sown May 4, yielded well. The onions were devastated by cutworms. Yellow Globe Danvers and Extra Early Red

Wethersfield were perhaps the best. Asparagus grown from seed sown late in 1914 wintered successfully, as did Victoria rhubarb, and several ornamentals, including lupines and hollyhocks. Several dozen crowns of asparagus received from Ottawa in 1915 started soon after transplantation and promise well. Strawberry plants arrived in a dark and wilty condition due to the long trail trip, and did not survive.

Out of fifty seedlings of Manitoba maple and fifty of caragana received from Lacombe, about forty of each sprang into vigorous growth.

REPORT OF REV. FATHER FALAIZE, FORT RESOLUTION, GREAT SLAVE LAKE.

The spring this year was extraordinarily early; on May 18 the lake was already free of ice; the first part of May, however, was not very warm.

The soil was in good condition by the second week of May and by the 26th of the month the sowings were all done. The next day a light rain came which helped in the germination of the seeds.

The first two weeks of June were wet and cold and the soil began to get hard. As the potatoes had started slightly many rotted. Some commenced to appear above ground on June 21, but they were not fully up until June 28 to 30.

From July 10 to 22 great heat was experienced; everything was suffering when on the 22nd a beneficial rain came which lasted two hours and which started vigorous growth. Several good rains followed so that good results have been obtained with everything.

From September 9 hard frost, with some hail and snow, was experienced and vegetation was stopped.

The following temperatures will give some idea of the season: April, max. 48° F., min. 2° F. May, max. 58·6° F., min. 34·2° F. June, max. 56·2° F., min. 36·6 F. July, max. 73·2° F., min. 46·4° F. August, max. 72·8° F., min. 50·8° F. September, 49·6 F., min. 33° F. October, max. 32·4° F., min. 22·3° F.

The harvest of potatoes was very good, although it was 200 sacks less than that of last year. At the neighbouring forts, however, especially at Fort Smith, all were frozen during the first days of August and again later. Here not one was frozen.

The cabbage succeeded well although they were badly attacked by a little worm in the ground, especially the Early Winningstadt and Early Market. The Premium Flat Dutch has resisted it well. Average heads of the Early Winningstadt weighed 7 pounds; Early Market, 6 pounds; and Premium Flat Dutch, 8 pounds. The Extra Early White Milan turnips were 6 and 7 pounds in weight, Robertson Golden Ball 7 to 12 pounds and the Early Snowball weighed 6 and 7 pounds.

No new seed was received in 1915 as the boat which carried our supply was lost in the rapids.

FORT RESOLUTION.

VEGETABLES.

Kind and Variety.	Quantity sown.	Date of sowing.	Date of germination.	Date when ready for use.	Date of harvesting.	Quantity harvested.
Carrots—						
Half Long Chaatenay	½ pkt.	May 19	May 29	Aug. 10	Sept. 20	100 lb.
Ontario Champion	½ "	" 19	" 29	" 10	" 20	125 lb.
Turnips:						
Extra Ey. White Milan	1 "	May 20	May 27	July 10	Sept. 18	1 bag.
Early Snowball	1 "	" 20	" 27	" 10	" 18	1½ bags.
Robertson Golden Ball	1 "	" 19	" 29	" 20	" 24	3 bags.
Parsnip:						
Hollow Crown	1 "	" 19	Did not germinate			
Beet:						
Witham Fireball	½ "	" 19	May 31	Aug. 10	Sept. 20	95 lb.
Peas:						
Sutton Excelsior	½ "	" 19	June 3	Aug. 1	Sept. 24	8 lb.
Thos. Laxton	½ "	" 19	" 3	" 1	" 24	8 lb.
Gradus	½ "	" 19	" 4	" 1	" 24	9 lb.
Stratagem	½ "	" 20	" 4	" 10	" 24	7 lb.
Cabbage:						
Premium Flat Dutch	¼ "	" 20	May 29	Sept. 15	Oct. 15	40 heads.
Early Winningstadt	¼ "	" 20	" 29	Aug. 20	Sept. 25	45 heads.
Early Market	¼ "	" 27	June 5	" 20	" 25	30 heads.
Celery:						
Unnamed	¼ "	" 19			" 24	20 lb.
Lettuce:						
Extra Ey. Paris Market	1 "	" 27	June 6	July 8		
Potatoes:						
Rochester Rose	25 lb.	" 23	" 30		Sept. 21	1 bag.
Vick Extra Early	25 lb.	" 23	" 30		" 21	1 bag.
Reeves Rose	25 lb.	" 23	" 30		" 21	1 bag.
Early Rose	60 bags	" 21–25	" 28	Sept. 1	" 18–22	350 bags.

FLOWERS.

Kind and Variety.	Date of sowing.	Date of germination.	Date when transplanted.	Growth and date of flowering.
Asters (mixed)	March 18 (hotbeds)	April 15	May 18	Flowered in Sept.
Stock	" 18 "	" 15	" 18	Flowered in Aug.
Pansy	" 18 "	" 15	" 18	Flowered in Aug
Snapdragon	April 20			Flowered in Sept.
Verbena	March 18	April 15	May 18	Flowered in Sept.
Sweet Peas	May 19 (in open)	May 30		Flowered in Aug.
Sweet William			May 18	Flowered in Aug.
Poppies	Self sown	May 15		Flowered all summer.
Gaillardia	May 18 (in open)			Flowered in Aug.
Sweet Alyssum	Self sown			Flowered all summer.
Mignonette	"			Flowered in Aug.
Balsam				Flowered in Aug.

FRUITS.

Cherries planted May, 1913, are 4 feet in height. Apple trees planted May, 1913, are 4 feet in height. Plum trees planted May, 1913, are 4 feet in height. Strawberries, twenty-five plants, set May, 1914, yielded 2 gallons fruit. Woodland strawberries, 30 plants, set May, 1911, yielded 2 gallons fruit.

Trees from maple seed planted May, 1912, are 9 feet high, and Lilacs transplanted May 17, 1915, are 1 foot in height.

FORT RESOLUTION.

Natural phenomena of interest to horticulturists are as follows: Snow disappeared first week of April. Rivers open May 2. May-flowers blooming May 13. Strawberries blooming May 15. Wild violets blooming May 16. Lake free of ice May 17. Wild gooseberries blooming May 19. First blooms of wild roses, June 8. Light frost June 14. First wild strawberries ripe June 16. First wild raspberries blooming June 22. First ripe raspberries August 4. First frost, September 10 and hard frost September 14.

REPORT OF REV. FATHER LELSUEM, FORT PROVIDENCE.

Notwithstanding the dryness all summer, and in spite of the hard frost of June 12 and June 15, the things sown have succeeded fairly well with the exception of turnips.

VEGETABLES.

Stratagem and Gradus peas were planted on April 23 and pricked out on June 17.

Half Long Chantenay carrot was sown on April 28, pricked out on June 7 and harvested September 17.

FORT SMITH.

The following report was sent by the Rev. Alphonse Mansoz, Fort Smith, Alta. This Sub-station is situated in latitude 60 on the Slave river. St. Bruno is 20 miles west of Fort Smith on the Salt river.

Fort Smith and St. Bruno are separated by only about 20 miles, but while the climate is very similar the soil is different, at Fort Smith it being sandy and at St. Bruno, of a black, strong character, so some plants might do better at one place than at another.

The year of 1915 was very unfavourable and very rigorous. A great drought which began almost from the time the snow disappeared continued most of the summer; hard frost, at three different times, when the condition of the vegetables led to the hope that a good harvest would occur, nearly destroyed everything. Notwithstanding severe conditions everything was ready around the beginning of May at both Fort Smith and St. Bruno, and by the 20th of that month all the sowings were made, including beets, carrots, onions, turnips and cabbage, all of which were tested in both places. By the 30th of May all the samples had germinated and notwithstanding the drought grew very vigorously by reason of the care given them. Rochester Rose and Early Rose potatoes and a rose brought from St. Albert, Alta., were grown, all of which were very fine. Towards the middle of June frost destroyed many of the plants. However, the different varieties of turnips and carrots resisted more or less. Towards the end of July the garden had regained its first fine appearance, when a second frost more severe than the first touched it again. The carrots, onions and beets partly resisted this cold by reason of the vigour of their stalks and a satisfactory harvest was made of these vegetables. The turnips reached an average weight of five pounds. The two varieties of onions reached a good size, when a third frost which came a few days before the middle of September necessitated harvesting them and putting them to cure under more favourable conditions. The frosts were even more severe at St. Bruno than at Fort Smith and the vegetables were destroyed. Having obtained these results in such a very bad year, it is hoped that better success will be attained in a more propitious season and soil for crops has been prepared for next year.

FORT SMITH.

REPORT OF EXPERIMENTS MADE IN 1915 BY DR. WM. GREENE, "THE GATES," HUDSON HOPE, B.C.

The following report was made by Dr. Wm. Greene, "The Gates," Hudson Hope, B.C., to whom seed had been sent for trial, although he has not a regular Sub-station. Hudson Hope is situated on the Peace river in latitude 56°.

POTATOES.

Name of Variety.	Plot sown.	Plot pulled.	Description of variety.	Amount planted.	Remarks.
Burbank	May 20	Sept. 20	Oval, pink, medium	91 pounds	Good yield, clean, cooks dry, early.
Seed from N. Dakota name lost.	" 15	" 25	Oval, white, large	97 "	Medium yield, clean, cooks too moist, too late for this latitude.
Local Seed name lost years ago.	" 20	" 25	Oval, pink, medium	90 "	Extra good yield, treated with Bichloride of mercury, scab, cooks dry.
Gold Coin	" 23	" 25	Oval, white, medium	27 "	Good yielder, hollow rot and scab, cooks dry, B.C.Gov. sample, late
Wee MacGregor	" 24	" 25	Oval, white	33 eyes	
Irish Cobbler	" 24	" 25	Round, white	33 "	
Sutton Satisfaction	" 24	" 25	Oval, pink, medium	33 "	Fair yield, will report on seed next season.
Early Ohio	" 24	" 25	Oval, pink, large	33 "	
					Burbank and Local seed recommended.
					Total yield 3,448 lb.

CORN.

Dominion Gov. Samples.	Sown.	Ready green.	Fully tasseled.	Silked.	Watery to full milk.	Ripe.	Kernels glazed.
Early Malcolm, sweet	May 7	Aug. 14	July 31	Aug. 15	Aug. 22	Sept. 24	Sept. 8
White Squaw	" 7	" 20	Aug. 5	" 14	" 26	Oct. 1	" 14
Sioux Squaw Improved	" 7			Did not	ripen.		

Only the exceptional season made the above possible.
I have saved seed to try next season.

HUDSON HOPE.

Vegetable Garden Record, 1915.

Vegetable.	Variety.	Put In.	Ready.	Notes.
Bean-bush	Round Red Valentine	May 15	Aug. 6	Thirty inches apart, two inches in row, up on June 5, Bloom July 11, Yield large, Quantity fair.
Bean-bush	Golden Wax	May 15	Aug. 1	Up on June 5, bloom July 8, Yield extra large, Quality extra fine, Aug. 7.
Beet	Edmond Ex. Er. Turnip	April 13	July 20	Eighteen inches apart, six inches in row. Average diameter 3¼". Many went to seed.
	Early Model	April 19	July 12	Average diameter 3¼". Few to seed.
	Burpee Columbia	April 19	July 20	Average diameter 3". The best beet.
	Giant Half Sugar	April 24	July 20	Harvested Sept. 15, large, good shape.
	Danish Imp. Sugar	April 24		Harvested Sept. 15. Fair.
Bean	Broad Windsor	May 2		Ripened for Seed. Yield extra good.
Borecole	Burpee Siberian Dwarf	April 19		Still in use.
Brussels Sprouts	Long Island Improved		Aug. 20	Hotbed March 16, Dwarf, wonderful yield.
Cabbage	Potter Red Dutch			Hotbed March 16, fine seedlings. Matured head poor and small.
	Burpee Copenhagan Market		Aug. 1	Hotbed March 16. First head pulled 8¾ lb. Very heavy yield.
	Danish Ballhead			Solid, later than Copenhagen Market, imported seed, small core, average weight 5 lb.
Carrot	Short Scarlet or Golden Ball	April 13	July 10	Fair.
	Burpee Chantenay	April 27	July 10	Good, smooth roots, very sweet, fine grain, large for Chantenay.
	Ox Heart	April 27	July 10	Very large, sweet, smooth.
	Large Yellow Belgian	April 26		Not suited for this section, roots too long, hard clay sub-soil.
Carrot	Short White	April 26		Field 30" apart, 6" in rows. Large, good shape, over half crop root rot.
Cauliflower	Burpee Best Early		July 26	Hot bed May 20th, average diameter head 8", average weight 4¼ lb. Very fine.
Celery	Golden Self-Bleaching	May 7	Aug. 21	Small, tough. Plot too dry.
Corn Salad	Large Round Leaf	May 7		Good.
Cress	Water	April 27		Seed sown in muskeg at close of season. Plants seemed hardy.
Celeraic	Turnip Rooted	April 27		Seeds did not germinate.
Endive	Burpee Giant Fringed	April 24		Neither did well.
	Steele Briggs Green Curled	April 24		
Kohl Rabi	White Vienna	April 27	July 10	Became woody very quickly, rapid growth. Quality delicate at about 2" diameter.
Lettuce	Burpee Wayahead	April 13	June 20	Extra large solid heads, crisp.
	Cos. Dwarf White Heart	April 13		Poor.
Onion	Australian Brown	April 8		Medium size, good yield.
	Red Wetbersfield	" 8		Large, yield good, average 2 29/64".
	Am. Prizetaker	" 8		Hot bed March 20th, cult. trial. Big necks.

HUDSON HOPE.

VEGETABLE Garden Record, 1915.—*Continued.*

Vegetable.	Variety.	Put In.	Ready.	Notes.
Onion—*Con.*	Gigantic Gibraltar	April 8		Hot bed March 20th. Large but big neck.
	Ex. Early Barletta	" 8		Some grew to 4½" diameter without turning green. Small necks.
	Yellow Globe Danvers	" 8		Medium size. Yield good.
				—
				Probably the Red Wetherfield is the best for this district, as far as my tests go.
Parsley	Ex. Curled Dwarf		June 20	Hot bed March 23rd, moved to field April 24th. Poor.
Parsnip	Offenham Market	April 7		Very hardy, large, excellent yield.
	Hollow Crown	April 7		Very hardy, large, excellent yield. Preference Offenham Market.
Pea	Dom. Gov. Sample, Am. Wonder.	April 24	July 20	
	Dom. Gov. Sample Gregory Surprise.	" 11	" 11	The sweetest.
	Blue Bantam	" 24	" 15	
	Gradus	" 24		
	Quite Content	" 24	" 20	
	Steele Briggs Western Beauty	" 24	" 17	Fine Flavour.
				All peas grew like weeds. Exceptional yield.
Radish	Burpee Scarlet Button	April 24		
	Bur. Hailstone	" 24		
	Bur. Crimson Giant Globe	" 24		
	Rapid Red	" 24		The best, will plant no other.
	White Chinese	June 26		All destroyed by root maggot.
Ruta-Bega	Burpee Golden Neckless	May 20		Good.
	Bur. Whitefleshed Neckless	" 20		The best for table use, although large. Not a bit woody.
	Bur. Breadstone	" 20		Fair.
	S. B. Co's Selected Purple Top.	" 20		Good for stock. Average 6½". If my figures are correct the yield would be about 21½ tons per acre.
	S. B. Co's Hazard's	" 20		Fair.
Salsify	Mam. Sand. Island	April 24		Many bad shaped roots, hard sub-soil. The roots averaged 13½" x 1⅝". Very delicate and delicious flavour.
Tomato	Earliana		Ripe Aug. 18	Hot bed Mar. 16th-20th. Continued to ripen until Sept. 5th. Saved seed. Wonderful for this latitude. The plants were not protected in any way during their outdoor period.
Mangel	S. B. Co. Mam. Long Red	April 26		Poor yield, rather small.
Swiss Chard	Burpee Lucullus	" 30		Poor.
Onion Sets	Red Wethersfield	" 26	July 27	Very large.
	Yellow Globe Danvers	" 26	" 27	Very large. Have saved seed from some.

HUDSON HOPE.

SESSIONAL PAPER No. 16

FLOWERS, 1915.

The flowers listed below were not given any special care, most of my time was given for "something to eat," as they express it in this district.

Asters—Beautiful, large.
Wild Cucumber—Eight feet.
Dianthus—Good; from seeded last year.
Digitalis—Fair.
Humulus—Twenty feet.
Helianthus—Some fine flowers and many varieties.
Nasturtiums—Dwarf, excellent.
Pansy—Many varieties, excellent, admired by many who did not believe they would grow in such profusion in this latitude
Phlox—Beautiful.
Poppies, Shirley—Fair.
Stocks—Poor.
Sweet Peas—A mixture of Spencer's. Beautiful, wonderful growth.
Sweet William—Seeded this year; good start.
Zinnia—Did almost as well as the catalogue describes them.
Wild Garden—Many flowers bloomed there; may have been seeds that did not germinate, but enough did their duty to make a fine showing.
Eschscholtzia—A solid round bed 8 feet diameter of the red. To me the most exquisite and delicate is the native Californian.

HERBS—1915.

Herb.	Variety.	Put in.	Ready.	Notes.
Summer Savory	*Satureia hortensis*	April 7	July 2	Fine, hardy plants.
Caraway	*Carum Carvi*	" 7		
Catnip	*Nepeta Cataria*	" 7		
Rosemary	*Rosmarinus officinalis*	" 7		All were planted in seed bed for transplanting April 7th. The only seedlings transplanted, Summer Savory; the others did not germinate in ground, although all were tested before sowing.
Lavender	*Lavandula Spica*	" 7		
Winter Savory	*Satureia montana*	" 7		
Sage	*Salvia officinalis*	" 7		

This past season was so remarkable that a report on any cultivated seed cannot be referred to as a test in this district.

The wild growth was abnormal.

The season began just right and closed as mildly.

All the cellars are full to the door, so with a shoe-string to snare rabbits the homesteaders are better fixed for the coming winter than many families in the overcrowded cities.

HUDSON HOPE.

DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

REPORT

FROM

THE CEREAL DIVISION

FOR THE

Fiscal Year Ending March 31, 1916

PREPARED BY

Dominion Cerealist, Ottawa, Ont.	Chas. E. Saunders, B.A., Ph.D.
Superintendent—	
Experimental Station, Charlottetown, P.E.I.	J. A. Clark, B.S.A.
Experimental Farm, Nappan, N.S.	W. W. Baird, B.S.A.
Experimental Station, Kentville, N.S.	W. S. Blair.
Experimental Station, Fredericton, N.B.	W. W. Hubbard.
Experimental Station, Ste. Anne de la Pocatière.	Joseph Bégin.
Experimental Station, Cap Rouge, P.Q.	Gus. A. Langelier.
Experimental Farm, Brandon, Man.	W. C. McKillican, B.S.A.
Experimental Farm, Indian Head, Sask.	W. H. Gibson, B.S.A.
Experimental Station, Rosthern, Sask.	Wm. A. Munro, B.A., B.S.A.
Experimental Station, Scott, Sask.	M. J. Tinline, B.S.A. (acting).
Experimental Station, Lethbridge, Alta.	W. H. Fairfield, M.S.
Experimental Station, Lacombe, Alta.	G. H. Hutton, B.S.A.
Experimentalist, St. Bernard Mission, Grouard, Alta.	Rev. Bro. Laurent.
Experimentalist, Beaverlodge, Alta.	W. D. Albright, B.S.A.
Experimentalist, Fort Vermilion, Alta.	Robert Jones.
Experimentalist, Fort Resolution, Mackenzie Dist.	
Experimentalist, Fort Providence, Mackenzie Dist.	
Experimental Farm, Agassiz, B.C.	P. H. Moore, B.S.A.
Experimental Station, Sidney, B.C.	L. Stevenson, B.S.A., M.S.

REPORT OF THE CEREAL DIVISION.

OTTAWA, March 31, 1916.

J. H. GRISDALE, ESQ., B. Agr.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith the thirteenth annual report of the Cereal Division, in which is given a brief account of some of the more important experiments and investigations which have been carried on during the past twelve months.

The season of 1915, which was extremely favourable for the production of remarkably large crops in many parts of Canada—particularly in the centre and west—was not very satisfactory at Ottawa, so far as cereals were concerned. The wet weather, which prevailed during the harvest, lowered the quality of nearly all the grain and seriously reduced the vitality of some lots. However, most of our varieties were harvested in fair condition.

In mid-summer my milling and baking assistant, Mr. R. W. Nichols, volunteered for overseas service. His absence makes a serious break in the work of which he had charge. This, however, is unavoidable, and I quite realize the paramount importance of the task to which he is now devoting himself. The qualities which he displayed while working in my Division make me perfectly confident that he will do his full share in active service in the defence of civilization and liberty.

I wish to bear testimony to the faithful and efficient work of all the other members of the staff of my Division, especially Mr. G. Gordon Moe, my chief assistant, Miss Mary C. Carter, my stenographer, and Mr. George J. Fixter, my foreman.

Following my own report will be found the reports on cereals, written by the Superintendents of the various branch Farms and Stations.

I have the honour to be, sir,
Your obedient servant,

CHARLES E. SAUNDERS,
Dominion Cerealist.

CORRESPONDENCE.

The following figures give the number of letters received and of letters and circulars despatched during the fiscal year. Most of the correspondence is carried on during the winter months:—

Letters received direct	10,159
Letters received through other offices on this Farm	3,168
Total letters received	13,327
Letters despatched, English	3,063
Letters despatched, French	535
Printed letters and circulars despatched	11,285
Total communications despatched	14,883

The use of a large number of printed letters is found necessary in order to answer as expeditiously as possible some of the more ordinary kinds of letters of enquiry which are received.

VISITS TO BRANCH FARMS AND STATIONS.

There are now so many points at which experiments in cereals are being carried on, that it is not possible to visit them all at a favourable time without seriously neglecting the work at Ottawa, which requires my presence during parts of July and August. Last season all the Stations in British Columbia were visited towards the end of June or early in July, and the southern stations in Alberta, Saskatchewan, and Manitoba immediately afterwards. In August and early in September all the Stations east of Ottawa were visited.

CONVENTION ATTENDED.

In the middle of July I attended, as the representative of the Department of Agriculture, the joint convention of the Great Plains Co-operative Experiment Association and the Great Plains Section of the American Society of Agronomy which was held at Mandan, North Dakota, in the buildings of the federal experiment station recently established there.

The series of meetings proved to be very interesting and valuable to those who are concerned with agricultural problems on prairie lands. I addressed the convention on the subject of "Varieties of Spring Wheat suitable for the Prairie Provinces of Canada."

MARQUIS WHEAT.

It is a pleasure to record the fact that for five years in succession Marquis wheat has won the highest award in the great international competitions. The winning exhibit this past season at the International Dry-farming Congress in Denver, Colorado, was sent by Mr. Seager Wheeler, of Rosthern, Sask. This is the third time, in five years, that Mr. Wheeler has gained the highest prize.

OTTAWA.

NEW BUILDING FOR THE CEREAL DIVISION.

The building on the Central Experimental Farm, which for the last few years has been used by the Cereal Division and the Division of Forage Crops, was unfortunately destroyed by fire in the early morning of July 24 last. A considerable amount of valuable seed of standard and new varieties of cereals was burned, but the harvest was just beginning and there was therefore no loss of grain of the current season, except a few bundles of selected plants of early-ripening, cross-bred barleys. There was, however, a serious loss of oats, emmers, spelts, and beans, owing to the fact that it was impossible to sow any plots of these last spring. A system of filing small samples of seed in another building—partly as a safeguard in case of fire—saved the varieties from being totally lost; but the regular experimental plots cannot be reintroduced for two or three years on account of the lack of seed.

Immediately after the fire, provision was made for carrying on the work of the Division in temporary quarters; and in a short time work was begun on the plans for a new building.

This was designed so that increased space would be available for the work of this Division and for the Division of Agrostology, to which only two rooms in the old building had been assigned. The former structure, erected in 1911, was of a plain design 40 by 70 feet. The new building is 40 by 90 feet, of pleasing and harmonious design, made with a balloon frame and square pitched roof. The exterior, finished with plain lumber and battens, with shingles on the sides of the upper story, presents an attractive appearance, while the interior finishings of matched wood—though inexpensive and suitable for the uses to which the rooms are to be put—are pleasing and satisfactory.

No claim of special novelty in plan or design is made, but the building is very well constructed to enable the work of the Divisions concerned to be carried on to good advantage. Efficiency and facility of work were the main objects in view. The rooms are convenient and sufficiently large, and the building is well provided with electric light and power.

A commodious basement extends the whole length of the structure. The space not required for furnaces, coal, etc., will be used partly for the housing of implements. As the building is situated on the side of a hill, the rear entrance leads directly into the basement, while the entrances at the side and front lead on to the main floor. On this floor a space 40 by 50 feet has been provided for the threshing of plots and for the temporary storage of unthreshed material. In the winter this space is used for the storage of the large quantities of seed grain which are required for distribution purposes. The remainder of this flat consists of four rooms and a hall. One of these rooms will be used by the Division of Agrostology. The others comprise a seed selection and bagging room 16 by 24 feet, a fanning-mill room 16 by 16 feet, and a room 16 by 20 feet, which will contain the large, stationary, grain-cleaning machinery, and will be provided with power from the main shaft in the threshing room.

The second floor contains a writing room, a baking room, a milling room, two rooms for seed and plant inspection and selection, a granary for the storage of the grain from the test plots and breeding plots, and three other rooms used by the Division of Agrostology. These rooms are lighted throughout by large dormer windows.

At the time of writing this report, most of the mills and other machinery lost, have not yet been replaced, but arrangements are being made to put in the new machinery as required.

It is a pleasure to record the fact that the erection of the new building proceeded rapidly, construction starting on the first of December and some of the rooms being ready for use early in March.

OTTAWA.

DISTRIBUTION OF SAMPLES OF SEED GRAIN AND POTATOES.

During the past winter the usual annual free distribution of samples of seed grain and potatoes has been carried on. The grain distributed was obtained from the Experimental Farms at Indian Head, Sask., Brandon, Man., Ottawa, Ont., Cap Rouge, Que., and Ste. Anne de la Pocatière, Que. The quality and appearance of most of the lots of seed were very good, though a few of them showed slight ill effects from wet weather.

As our usual, efficient grain-cleaning machines were not available this winter, the grain was cleaned and graded entirely by fanning mills. A great deal of it was also hand-picked.

It is intended that all grain sent out shall be above fair criticism. Occasionally however it is necessary to distribute seed which is not so plump and bright as we could wish, when no other seed of equal purity and of equally good pedigree is obtainable. If we are obliged to sacrifice either intrinsic quality or appearance, we invariably sacrifice the latter.

A smaller number than usual of samples has been distributed this season. Owing to the difficulties produced by the destruction of the cereal building, it was not possible to accept as many applications as in other years. The time-limit for the acceptance of requests was therefore enforced more rigidly than usual.

Farmers who desire to secure a sample from this free distribution should apply in November or December, and, to avoid trouble and delay, must give a clear statement of their needs, so that a suitable variety may be sent without further correspondence. Applicants for potatoes from other provinces than Ontario and Quebec are supplied from the branch Experimental Farms.

The following tables show the number of samples distributed from Ottawa:—

DISTRIBUTION Classified by Varieties.

Name of Variety.	Number of Packages.	Name of Variety.	Number of Packages
Oats—		Barley (six-row)—	
Banner	603	Manchurian	597
Victory	274	O. C. A. No. 21	13
Ligowo	96		610
Daubeney	85		
	1058	Peas—	
		Arthur	885
Spring Wheat—		Potatoes—	
Marquis	734	Green Mountain	816
Prelude	153	Irish Cobbler	389
Huron	144		1205
Red Fife	70		
Pioneer	21		
	1122		

DISTRIBUTION Classified by Provinces.

—	Prince Edward Island.	Nova Scotia.	New Brunswick.	Quebec.	Ontario.	Manitoba.	Saskatchewan.	Alberta.	British Columbia.	Total.
Oats	12	50	23	502	155	60	122	99	35	1058
Barley	1	30	10	239	58	63	80	85	44	610
Wheat	11	76	24	324	96	76	223	235	57	1122
Peas	2	28	22	351	146	56	111	109	60	885
Potatoes	.....	.....	.....	740	465	.....	.....	.....	.....	1205
Total	26	184	79	2156	920	255	536	528	196	4880

SEED GRAIN FOR SALE.

The Dominion Cerealist will be glad to furnish information, as far as possible, to intending purchasers of seed grain, as to the nearest sources for good seed. Farmers and seedsmen, from any part of Canada, are advised to send in their names to the Dominion Cerealist, with statements of the quantities of good seed which they have for sale. Small samples should also be sent when possible. It is very seldom that any seed grain is purchased for the Cereal Division; but we wish to be in a position to put buyers in touch with sellers, to their mutual advantage.

Most of the branch Experimental Farms have seed grain for sale, generally in quite limited quantities. There is also occasionally a small surplus of seed at Ottawa, after the free distribution has been finished, which is available for sale, usually in two-bushel lots.

VITALITY TESTS OF SEED GRAIN.

Vitality tests of seed grain grown in 1915 at the Central Experimental Farm and at the branch Experimental Farms gave the following results:—

CENTRAL EXPERIMENTAL FARM, OTTAWA.

Kind of Seed.	Number of Tests.	Highest Percentage.	Lowest Percentage.	Average Vitality.
Spring Wheat	192	100	70	96·0
Barley	228	100	11	82·1
Peas	63	100	38	80·7
Flax	31	97	38	77·9

BRANDON, MAN.

Spring Wheat	16	100	94	97·6
Barley	18	100	64	93·5
Oats	18	100	89	96·5
Peas	9	68	42	50·0
Flax	9	100	81	93·7

CAP ROUGE, QUE.

Spring Wheat	8	99	84	95·3
Barley	5	100	99	99·8
Oats	6	100	97	98·5
Peas	5	75	32	62·8
Flax	2	100	78	89·0

CHARLOTTETOWN, P.E.I.

Spring Wheat	15	100	53	80·8
Barley	18	100	85	95·5
Oats	19	100	90	97·1
Peas	4	73	44	64·0

FORT VERMILION, ALBERTA.

Spring Wheat	11	100	88	97·6
Barley	7	100	98	99·7
Oats	5	100	93	98·0
Peas	2	49	47	48·0

FREDERICTON, N.B.

Spring Wheat	5	82	47	69·4
Barley	5	98	63	84·8
Oats	5	100	90	94·2

INDIAN HEAD, SASK.

Spring Wheat	27	100	94	98·3
Barley	24	100	88	96·8
Oats	17	100	89	96·7
Rye	1			87·0
Peas	9	71	46	51·0
Flax	3	100	95	96·6

VITALITY Tests of Seed Grains.—*Concluded.*

KENTVILLE, N.S.

Kind of Seed.	Number of Tests.	Highest Percentage.	Lowest Percentage.	Average Vitality.
Spring Wheat	2	91	59	75·0
Barley	2	94	89	91·5
Oats	4	100	88	94·0
Peas	2	81	62	71·5

LACOMBE, ALBERTA.

Spring Wheat	15	92	74	80·8
Barley	15	96	68	88·4
Oats	16	96	60	85·5
Rye	1	.....	.....	80·0
Peas	6	63	14	34·5
Flax	2	36	35	35·5

ROSTHERN, SASK.

Spring Wheat	14	100	95	98·0
Barley	19	100	91	98·2
Oats	11	100	86	94·3
Peas	6	97	70	81·3

STE. ANNE DE LA POCATIÈRE, QUE.

Spring Wheat	2	99	97	98·0
Barley	2	98	92	95·0
Oats	2	99	95	97·0
Peas	1	.....	.....	96·0

SCOTT, SASK.

Spring Wheat	12	100	92	95·6
Barley	9	98	91	95·5
Oats	12	99	79	90 9
Rye	1	.....	....	77·0
Peas	6	100	62	83·1
Flax	3	72	58	67·3

MILLING AND BAKING RESEARCHES.

The enlistment of my milling and baking assistant, Mr. R. W. Nichols, for overseas service, has made necessary the suspension of all the researches which he was carrying on. The destruction by fire of the flour mill has stopped the milling work altogether for the present. A few baking tests were made during the past winter, but they were not sufficiently numerous to give any results for publication.

This important branch of the work of the Cereal Division will be resumed as soon as possible.

OTTAWA.

CENTRAL EXPERIMENTAL FARM, OTTAWA, ONT.

The following pages of this section of the report deal with the work in cereals as carried on at Ottawa under the immediate supervision of the Dominion Cerealist.

THE SEASON.

Favourable weather and the early disappearance of the snow permitted the seeding of the first wheat on the 16th of April. Sowing proceeded steadily from the 24th onward. Cool weather prevailed during May, accompanied by drought during the latter part of the month and early in June. As a consequence cereal growth was somewhat retarded. However, warm rains from about the 12th of June onward compensated somewhat for the previous lack of moisture; growth was hastened, and by the 5th of July heavy, rank, prolific-looking straw gave promise of an abundant crop. Unfortunately, high winds on this date bore down many of the multiplying strips and test plots. Ripening proceeded slowly, the earliest maturing wheats and barleys being cut on the 25th of July. From this time forward harvesting operations proceeded under extreme difficulties. Heavy rains and a humid atmosphere prevented proper drying, even when temperatures were rather high; and some of the grain sprouted in the stooks, though covers were used extensively. Frequent opening and turning of the stooks and occasional opening of the sheaves materially reduced the yields of the plots, while the quality of the grain was seriously affected by the early lodging and heavy rains. A few days of fine weather in the latter part of August aided the conclusion of harvesting. These unfavourable conditions prevailed not only at Ottawa but were quite general in this province and in parts of Quebec. The losses of grain of many farmers were heavy.

CROSSING AND SELECTION OF CEREALS, ETC.

No new crosses are being made at present, as the amount of material now on hand is much too great for the land and staff allotted to the Cereal Division.

Among the most interesting groups of crosses which are being fixed may be mentioned those between Prelude wheat and other varieties, Prelude × Marquis being perhaps the most interesting of these.

Several beardless sorts from Prelude wheat were isolated a few years ago and some of them were tested in the regular plots for the first time last season. None will be introduced until we are sure that no valuable characteristic of Prelude has been lost in them.

A large quantity of unfixed material of great scientific interest, and displaying some new characters, has been produced from crosses between Arlington Awnless and various other barleys. In flax, some crosses made several years ago have given hundreds of new sorts, some of which are now almost fixed. The crosses were made, and the selections are being carried on, with a view to the production of varieties useful for fibre as well as for seed.

PLOTS OF CEREALS, ETC., AT OTTAWA.

In 1915 there were sown at Ottawa 694 small plots of cross-bred varieties not yet fixed in character, and 447 plots (chiefly small) of new varieties and selections which are now true to type and are being increased for test on a larger scale. There were also twelve small plots of flax for fibre.

The regular test plots of grain, for the comparison of varieties, are one-sixtieth of an acre each. The number of plots of this size last season was as follows: Spring wheat, 206; barley, 260; field peas, 61; and flax, 29; making a total of 556 plots, and representing about 500 varieties and selected strains.

The total number of plots of all sizes was 1,709.

Owing to the shortage of land for the Cereal Division, the regular test plots of oats, rye, emmer, spelt, and beans had to be omitted.

EXPLANATION OF THE TABLES.

A careful study of the effects of irregularities in the soil of our fields, and the effects of differences in the dates of the sowing of varieties which are being compared, has shown clearly that the figures actually obtained for yield, days maturing, etc., are in many cases misleading—though quite accurate. Hence for the proper comparison of varieties it is essential to introduce various corrections. These are rather too numerous and complicated to be easily explained. It appears advisable therefore to present in the tables, the facts as observed.

The character of the straw is indicated by marks on a scale of ten points according to the proportion of the plot standing erect at harvest time. A variety standing quite erect receives a mark of ten, while one completely lodged is marked 0.

As a rule, only named varieties are mentioned in the tables. Most of the varieties under test are new cross-bred sorts produced by the Dominion Cerealist and recorded for the present by means of numbers and letters. As soon as the value of these sorts has been determined, names will be given to such of them as possess sufficient merit to warrant their introduction to the public.

SPRING WHEAT.

One hundred and ninety-two varieties and selected strains of spring wheat were sown in the regular one-sixtieth acre trial plots at Ottawa. The wheat was sown from the 24th to the 29th of April, the seed being used at the rate of about one and one-half bushels to the acre. Cutting commenced on the 28th of July, a few days later than usual. Prelude was the first variety cut.

Owing to the unfavourable nature of the season, very irregular results were obtained, the extreme yields being 63·5 bushels and 9 bushels per acre.

Those sorts which have a letter or an Ottawa number after the name are new varieties or selections produced by the Dominion Cerealist.

SPRING WHEAT.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days maturing	Average length of straw including head.	Strength of straw on a scale of 10 points.	Average length of head.	Yield of grain per acre.	Yield of grain per acre.	Weight per measured bushel after cleaning
					Inches		Inches.	Lb.	Bu. lb.	Lb.
1	Bobs, reselected	April 24	Aug. 2	100	46	10	3·5	3,810	63 30	64·8
2	Early Red Fife, Ottawa 16	" 24	" 9	107	48	6	3·7	2,880	48 ..	62·2
3	Goose	" 24	" 5	103	46	7	2·5	2,850	47 30	65·0
4	Early Russian, Ottawa 40	" 24	" 5	103	46	0	3·5	2,820	47 ..	62·0
5	Chelsea, Ottawa 10	" 24	" 4	102	50	1	4·2	2,760	46 ..	58·5
6	White Russian C	" 24	" 9	107	48	4	4·0	2,760	46 ..	61·0
7	White Russian D	" 24	" 9	107	48	7	4·0	2,700	45 ..	58·9
8	Bishop, Ottawa 8	" 24	" 2	100	42	4	3·2	2,670	44 30	60·5
9	Yellow Cross Beardless A	" 24	" 5	103	50	7	3·5	2,550	42 30	61·6
10	White Fife, Ottawa 11	" 24	" 9	107	48	5	4·0	2,520	42 ..	61·6
11	Red Fern C	" 24	" 6	104	50	9	5·0	2,130	35 30	61·1
12	Yellow Cross Beardless B	" 24	" 5	103	50	5	3·5	2,040	34 ..	59·7
13	Red Fife, Ottawa 17	" 24	" 9	107	48	6	4·0	1,980	33 ..	60·4
14	Huron, Ottawa 3	" 28	" 10	104	49	7	5·0	1,890	31 30	57·5
15	Hungarian White B	" 24	" 9	107	48	10	4·0	1,770	29 30	61·0
16	Huguenot A	" 24	" 5	103	46	10	2·5	1,740	29 ..	59·3
17	Huguenot B	" 24	" 5	103	46	10	2·5	1,260	21 ..	57·8
18	Pioneer, Ottawa 195	" 24	" 2	100	44	10	4·0	1,260	21 ..	63·0
19	Onega A	" 24	" 1	99	40	10	3·2	1,110	18 30	56·0
20	Persian Red	" 24	" 1	99	42	4	3·0	930	15 30	61·8
21	Hungarian White D	" 24	" 9	107	48	8	4·0	870	14 30	60·3
22	Kubanka B	" 24	" 17	115	42	5	2·5	810	13 30	59·0
23	Marquis, Ottawa 15	" 24	" 8	106	40	8	4·5	810	13 30	56·7
24	Prelude, Ottawa 135	" 24	July 28	95	36	10	2·5	780	13 ..	64·4
25	Kubanka A	" 24	Aug. 17	115	42	5	2·5	690	11 30	60·5

RECOMMENDED VARIETIES OF SPRING WHEAT.

For Ontario and Quebec.—Huron, very productive, early ripening, bearded, giving flour of fair baking strength. Marquis and Early Red Fife, early ripening, beardless, giving flour of very high baking strength. Red Fife and White Fife rather late in ripening, beardless, giving flour of very high strength. The extremely early ripening variety Prelude will be useful in some northern localities. It is an excellent variety but should not be expected to give a very large yield. It is not adapted for dry districts.

For the Maritime Provinces.—Red Fife and White Fife are very good. If early sorts are required, Huron and Marquis are recommended. White Russian is popular. It gives a large yield, but is of poor quality for bread-making.

OTTAWA.

For Manitoba and Saskatchewan.—Marquis is the best variety for most districts. Red Fife is excellent for localities where there is no danger of early frosts. For districts where extreme earliness is required and where there is sufficient rainfall to produce a good length of straw, the new variety Prelude is highly recommended. Pioneer, another new and very early ripening sort, should be given a trial if the conditions are too dry for Prelude.

For Alberta.—Red Fife is perhaps the best sort for some of the dry areas towards the south, but, wherever there is sufficient rainfall, Marquis should be tried. If early-maturing varieties with longer straw than Marquis are essential, Huron or Early Red Fife should be tested. Pioneer, a new variety recently introduced by the Dominion Cerealist, ripens earlier than any of the above-mentioned sorts, and has given good results under dry conditions. It is bearded and produces straw which is usually of fair length. It is not adapted to moist districts. For all localities where the tendency is towards the production of excessively long straw, and where a very early-ripening wheat is required, Prelude is unquestionably the best variety known.

For British Columbia.—Huron is one of the best varieties. Red Fife and Marquis may not generally give quite such large crops but they are more popular for bread-making. Prelude or Pioneer may be useful in a few localities where extreme earliness is essential.

EMMER AND SPELT.

Owing to the shortage of land for the use of the Cereal Division, the plots of emmer and spelt could not be sown.

Common Emmer—often incorrectly called "Speltz"—is one of the best varieties. However, for most districts, under ordinary conditions of climate and farming, it has not proved as valuable as the more common cereals, and its use is therefore not advised.

OATS.

Owing to shortage of land the regular variety tests of oats could not be made last season.

RECOMMENDED VARIETIES OF OATS.

Among the most productive varieties of white oats, Banner is especially recommended. Ligowo is somewhat earlier in ripening, but does not generally give quite so large a yield as Banner. Two new sorts, Victory (also called Seger and Conqueror) and Ontario Agricultural College No. 72 (a selected strain of Siberian) are now attracting considerable attention. They are excellent, productive kinds, but the No. 72 is rather late in ripening. Gold Rain is a very prolific yellow oat. Black oats are not recommended, but Pioneer and Excelsior may be mentioned as two of the best.

Farmers who require an extremely early-ripening variety should try Eighty Day, Orloff or Sixty Day. The name Sixty Day is misleading, as this oat is not earlier than the other two. Daubeney is another similar sort, almost as early as Eighty Day, and generally producing a somewhat larger crop, longer straw and larger kernels. All these oats are, however, small in kernel; and they seldom yield as well as the later sorts.

BARLEY.

As there seems to be no sufficient reason for separating barleys into two great groups, according to whether the heads are of the 2-row type or not, it has been decided, in future, to report on all the varieties together. As a matter of fact the old classification is very arbitrary and unsatisfactory.

OTTAWA.

Two hundred and twenty-eight varieties of barley were sown in the regular plots last season. The grain was sown at the rate of about two bushels per acre, when the seeds were large, and one and a half bushels when the seeds were very small. The sowing of the plots was begun on the 30th of April and finished on the 11th of May. This extended (but unavoidable) period of seeding, renders very difficult the interpretation of the results obtained.

The highest yield was at the rate of 75 bushels 30 pounds per acre, and the lowest 21 bushels 42 pounds.

Those sorts which have a letter or an Ottawa number after the name are new varieties or selections produced by the Dominion Cerealist.

BARLEY.—Test of Varieties.

Number.	Name of Variety.	Date of Sowing	Date of Ripening.	No. of days maturing.	Average length of straw including head.	Strength of straw on a scale of 10 points.	Average length of head.	Yield of grain per acre.	Yield of grain per acre.	Weight per measured bushel after cleaning
					Inches		Lb.	Bu. lb.	Lb.	Inches.
1	Gold (2)	April 30	Aug. 5	97	40	0	3·2	3,620	75 30	52·1
2	Finnish 6 row	" 30	" 2	94	35	10	2·2	3,540	73 36	44 9
3	Duckbill C (2)	" 30	" 9	101	44	4	3·7	3,300	68 36	50·3
4	Swan's Neck (2)	May 3	" 2	91	48	7	4·0	3,240	67 24	50·8
5	Canadian Thorpe D (2)	April 30	" 8	100	46	2	3·5	3,180	66 12	52·0
6	O. A. C. N° 21 (6)	May 3	July 31	89	46	10	3·5	3,150	65 30	46·5
7	Taganrog A. (6)	" 4	Aug. 1	89	44	4	3·5	3,150	65 30	46·5
8	Finnish 2 row No. 1	April 30	" 6	98	47	9	3·5	3,120	65 ..	52·3
9	Goldthorpe B (2)	" 30	" 9	101	44	7	3·5	3,060	63 36	52·1
10	Swedish Chevalier (2)	May 3	" 9	98	44	5	5·0	3,030	63 6	52·0
11	Manchurian, Ottawa 50 (6)	" 7	" 2	87	41	8	4·0	2,970	61 42	45·5
12	Primus (2)	" 3	" 7	96	47	4	3·5	2,940	61 12	51·8
13	Early Indian (6)	April 30	July 25	86	31	0	2·2	2,910	60 30	45·1
14	Manchurian G (6)	May 3	" 31	89	45	10	4·0	2,910	60 30	45·8
15	Early Chevalier, Ottawa 51 (2)	April 0	Aug. 2	94	52	3	4·0	2,880	60 ..	50·0
16	Gordon A. (2)	" 30	" 4	96	54	5	3·5	2,880	60 ..	51·7
17	Goldthorpe C (2)	" 30	" 9	101	44	10	3·5	2,880	60 ..	52·0
18	Duckbill B (2)	April 30	" 6	98	42	10	3·7	2,850	59 18	52·0
19	Manchurian H. (6)	May 3	July 31	89	45	10	4·0	2,850	59 18	46·2
20	Yale D. (6)	" 4	Aug. 2	90	48	6	2·7	2,850	59 18	48·0
21	Triumph (6)	" 4	" 8	96	45	9	3·5	2,820	58 36	45·6
22	Invincible (2)	" 3	" 9	98	47	2	4·0	2,790	58 6	51·3
23	Canadian Thorpe E (2)	April 30	" 8	100	46	6	3·5	2,760	57 24	51·8
24	Escourgeon (6)	" 0	" 9	101	46	2	3·5	2,730	56 42	49·0
25	Standwell (2)	May 3	" 1	90	48	8	4·5	2,730	56 42	51·5
26	Goldthorpe A. (2)	April 30	" 9	101	44	1	3·5	2,700	56 12	50·1
27	Star (6)	May 3	" 6	95	34	10	2·0	2,670	55 30	45·7
28	Yale G. (6)	" 4	" 1	89	48	7	2·7	2,670	55 30	46·8
29	French Chevalier (2)	April 30	" 7	99	50	5	4·5	2,640	55 ..	51·5
30	Goldthorpe D (2)	" 30	" 9	101	44	5	3·5	2,640	55 ..	51·7
31	Odessa D. (6)	May 3	" 1	90	50	4	4·0	2,640	55 ..	45·3
32	Gordon E. (2)	" 3	" 2	91	50	7	3·5	2,610	54 18	51·7
33	Odessa F. (6)	" 3	" 1	90	50	5	4·0	2,580	53 36	44·7
34	Nugent C. (6)	" 3	" 1	90	48	5	4·0	2,520	52 24	46·1
35	Nugent K. (6)	" 3	" 1	90	44	5	4·0	2,490	51 42	46·0
36	Yale C. (6)	" 4	" 2	90	48	4	2·7	2,490	51 42	48·5
37	Yale F. (6)	" 4	" 2	90	46	8	2·7	2,490	51 42	46·5
38	Yale H. (6)	" 4	" 1	89	48	10	2·7	2,490	51 42	49·0
39	Nugent A. (6)	" 3	" 1	90	48	9	4·0	2,460	51 12	44·0
40	Odessa C. (6)	" 3	" 1	90	50	8	4·0	2,460	51 12	46·0
41	Stella A. (6)	" 3	" 1	90	50	4	4·0	2,460	51 12	46·4
42	Nugent D. (6)	" 3	" 1	90	48	10	4·0	2,430	50 30	47·1
43	Yale E. (6)	" 4	" 2	90	46	5	2·7	2,430	50 30	46·8
44	Stella G. (6)	" 3	" 1	90	50	9	4·0	2,400	50 ..	46·4
45	Clifford (2)	April 30	" 2	94	54	6	4·2	2,370	49 18	50·7
46	Nugent E. (6)	May 3	" 1	90	42	10	4·0	2,370	49 18	46·3
47	Success B. (6)	" 3	July 29	87	47	8	4·0	2,340	48 36	44·3
48	Kutais (2)	" 3	Aug. 2	91	48	4	4·5	2,280	47 24	51·0
49	Nugent B. (6)	" 3	" 1	90	43	10	4·0	2,280	47 24	46·3

BARLEY—Tests of Varieties.—*Concluded.*

Number	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days maturing.	Average length of straw including head.	Strength of straw on a scale of 10 points.	Average length of head.	Yield of grain per acre.	Yield of grain per acre.	Weight per measured bushel after cleaning
					Inch's		Inches.	Lb.	Bu. lb.	Lb.
50	Guymalaye (6)	May 3	July 31	89	36	10	3·0	2,250	46 42	62·8
51	Nugent L. (6)	" 3	Aug. 1	90	44	10	4·0	2,250	46 42	45·0
52	Stella C. (6)	" 3	" 1	90	50	6	4·0	2,250	46 42	46·1
53	Oderbruch (6)	" 3	" 1	90	46	10	4·2	2,220	46 12	47·5
54	Black Two-row	April 30	" 9	101	33	5	4·0	2,190	45 30	49·4
55	Nugent H. (6)	May 3	" 1	90	40	8	4·0	2,190	45 30	44·0
56	Gordon B. (2)	April 30	" 2	94	54	8	3·5	2,160	45 ..	46·8
57	Caucasian Hulless (6)	" 30	July 31	92	30	8	4·0	2,100	43 36	62·0
58	Yale A. (6)	May 4	Aug. 4	92	48	10	2·7	2,100	43 36	48·4
59	Nugent F. (6)	" 3	" 1	90	40	10	4·0	2,070	43 6	48·1
60	Yale B. (6)	" 4	" 4	92	48	9	2·7	2,040	42 24	49·1
61	Gordon D. (2)	April 30	" 2	94	50	10	3·5	2,010	41 42	50·2
62	Binder (2)	" 30	" 2	94	34	8	4·5	1,950	40 30	50·7
63	Swedish 6-row Type I	May 3	" 8	97	36	8	4·0	1,950	40 30	45·0
64	Blue Short Head A. (6)	April 30	" 9	101	26	10	2·0	1,920	40 ..	43·0
65	Jarvis (2)	May 3	" 2	91	50	9	5·5	1,800	37 24	50·5
66	Blue Short Head C. (6)	April 30	" 9	101	26	10	2·0	1,770	36 42	43·2
67	Nugent G. (6)	May 3	" 1	90	40	10	4·0	1,770	36 42	47·1
68	Swedish 6-row Type II	" 4	July 31	88	33	10	2·0	1,650	34 18	43·8
69	Albert B (6)	April 30	" 29	90	44	10	2·7	1,590	33 6	48·0
70	Albert A. (6)	" 30	" 29	90	44	10	2·7	1,500	31 12	47·5
71	Beaver E. (2)	" 30	Aug. 1	93	50	10	5·0	1,470	30 30	49·4
72	Beaver B. (2)	" 30	" 1	93	50	10	5·0	1,230	25 36	47·3
73	Beaver D. (2)	" 30	" 1	93	50	10	5·0	1,200	25 ..	47·0
74	Black Japan (6)	" 30	" 5	97	32	8	2·2	1,080	22 24	45·0

RECOMMENDED VARIETIES OF BARLEY.

Among the most productive six-row barleys are Manchurian, O.A.C. No. 21, and Odessa. Among the prolific two-row sorts may be mentioned Gold (a new Swedish variety with rather unsatisfactory straw), Duckbill, and some of the strains of Chevalier. Early Chevalier is an extra early strain, but is not remarkably productive.

The hooded (or 'beardless') types of barley at present obtainable in commerce are not very satisfactory. Success and Champion are two of the best kinds. They are both very early in ripening, but they generally give a rather small yield. These are six-row barleys.

The common sorts of hulless barley are Hulless White (a hooded sort), and Hulless Black (bearded). These are not specially productive and have rather poor straw as a rule.

SPRING RYE.

Owing to the shortage of land, the usual plots of spring rye had to be omitted.

FIELD PEAS.

Fifty-one varieties of field peas were sown in the regular test plots on May 12. The seed was used at the rate of about two bushels per acre in the case of small peas, and three bushels when the peas were large. The very wet weather in August materially lowered both the yield and quality of the seed harvested. The highest yield obtained was at the rate of 50 bushels to the acre, and the lowest yield was 20·5 bushels.

Only the named sorts are mentioned in the table.

PEAS.—Test of Varieties.

Number	Name of Variety.	Size of Pea.	Date of Sowing.	Date of Ripening.	Number of days maturing	Average length of Straw.	Average length of Pod.	Yield of grain per acre.	Yield of grain per acre.	Weight per measured bushel after cleaning
						Inches.	Inches.	Lb.	Bu. lb.	Lb.
1	Solo	Large	May 12	Aug. 17	97	72	2·5	2,520	42 ..	61·0
2	Arthur, Ottawa 18	Medium	" 12	" 17	97	53	2·2	2,497	41 37	62·5
3	Mackay	Large	" 12	" 25	105	80	2·2	2,400	40 ..	63·8
4	Prince	"	" 12	" 25	105	72	2·2	2,400	40 ..	64·0
5	Picton	Medium	" 12	" 21	101	74	2·2	2,130	35 30	64·1
6	Prussian Blue	"	" 12	" 21	101	68	2·0	2,040	34 .	63·8
7	White Marrowfat	Large	" 12	" 26	106	74	2·5	1,890	31 30	63·8
8	English Grey	"	" 12	" 17	97	48	2·5	1,770	29 30	60·2
9	Golden Vine	Small	" 12	" 15	95	65	2·2	1,470	24 30	63·8
10	Chancellor	"	" 12	" 14	94	54	2·0	1,260	21 ..	63·2

RECOMMENDED VARIETIES OF FIELD PEAS.

Among the best sorts which are available to the public may be mentioned Arthur, Golden Vine, and Prussian Blue. Arthur is a yellow pea, of medium or above medium size, and is a little earlier in ripening than most other sorts. Golden Vine is a small yellow pea.

FIELD BEANS.

No regular plots of beans could be sown, last season, owing to the lack of suitable land.

FLAX.

Thirty-one selected strains of flax were grown in the regular test plots. The seed was sown on May 14, at the rate of about 60 pounds per acre. The yield would have been satisfactory had the crop not been seriously injured by the wet weather in August.

All the strains under test were selected at Ottawa.

The strains named Foremost are selections out of the popular western variety, Premost.

FLAX.—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days maturing.	Average length of Plants.	Yield of seed per acre.	Yield of seed per acre.	Weight per measured bush. after cleaning.
					Inches.	Lb.	Bush. Lb.	Lb.
1	La Plata B	May 14	Aug. 12	90	24	1,440	25 40	52·7
2	La Plata C	" 14	" 12	90	28	1,350	24 6	54·0
3	Foremost C	" 14	" 10	88	28	1,260	22 28	55·2
4	La Plata A	" 14	" 12	90	28	1,200	21 24	51·4
5	Foremost A	" 14	" 10	88	36	1,170	20 50	53·0
6	Common D	" 14	" 3	81	26	1,140	20 20	54·3
7	White Flowering B	" 14	" 8	86	30	1,110	19 46	54·0
8	Foremost B	" 14	" 10	88	28	1,080	19 16	54·0
9	Novelty	" 14	" 7	85	28	1,080	19 16	52·8
10	White D 3	" 14	" 3	81	18	1,050	18 42	53·1
11	Common C	" 14	" 10	88	30	1,020	18 12	54·2
12	White A	" 14	" 9	87	24	1,020	18 12	54·5
13	White E 3	" 14	" 2	80	26	1,020	18 12	51·9
14	White D 1	" 14	" 3	81	18	990	17 38	53·2
15	White B	" 14	" 2	80	24	960	17 8	55·3
16	White C	" 14	" 2	80	22	960	17 8	53·5
17	White E 1 A	" 14	" 3	81	18	960	17 8	53·5
18	White Flowering A	" 14	" 3	81	24	900	16 4	53·6
19	Common A	" 14	" 3	81	27	870	15 30	52·8
20	Yellow Seed B	" 14	" 11	89	36	870	15 30	54·0
21	White E 1 B	" 14	" 3	81	18	840	15 ..	52·0
22	Common B	" 14	" 8	86	30	810	14 26	54·8
23	White E 2	" 14	" 1	79	20	810	14 26	52·5
24	Yellow Seed C	" 14	" 11	89	36	780	13 52	53·0
25	Yellow Seed A	" 14	" 11	89	36	750	13 22	53·9
26	Russian B	" 14	" 3	81	36	570	10 10	54·3
27	Riga B	" 14	" 3	81	30	540	9 36	54·2
28	Longstem	" 14	" 10	88	36	480	8 32	53·1
29	Riga C	" 14	" 3	81	30	450	8 2	54·8
30	Russian A	" 14	" 3	81	30	450	8 2	55·1
31	Riga A	" 14	" 9	87	30	300	5 20	52·2

EXPERIMENTAL STATION, CHARLOTTETOWN, P.E.I.

J. A. CLARK, B.S.A., SUPERINTENDENT.

SEASONAL NOTES.

The winter of 1914-15 was unusually mild. Two brief cold waves gave zero weather at Christmas and around the first of February. After each cold spell the frost came entirely out of the ground during the mild weather that followed. Heavy falls of snow, in March, that remained a considerable time, gave excellent protection to the fields and as it melted soaked slowly into the ground. Large bodies of ice along the coast kept the season backward. May was cold and wet. Seeding on dry land commenced on May 15. No June frosts occurred at this Station. June and July were good growing months, beneficial showers falling at frequent intervals. The harvest weather during August and September was very favourable and the cereals were saved in good condition. The first grain was cut on August 21.

CEREAL AREA.

A four-year rotation known as "F" was laid off for cereals in 1914. It is planned to give a maximum area to cereals and yet maintain the fertility of the land. The rotation is as follows:—

First year.—Hoed crop. Test of roots, potatoes, corn and peas.

Second year.—Grain. Plots of wheat and barley. Seeded down with 10 pounds of red clover, 2 pounds of alsike, and 5 pounds of timothy per acre.

Third year.—Clover hay; 8 tons of manure per acre are applied after the hay is cut and ploughed under in the early autumn.

Fourth year.—Grain. Oat plots, seeded down with 8 pounds of red clover and 2 pounds of alsike.

UNIFORM TEST PLOTS OF CEREALS.

The season was late and considered unfavourable except for the dry land, the cereal crops of the province generally being below the average yield. The uniform test plots were sown in duplicate, as far as the land permitted, on one-sixtieth acre plots on the following dates: Spring wheat, May 17; oats, May 18; peas, May 22; and barley, June 2.

The wheat plots were free from stinking smut. The loose smut of wheat was hand-picked. The amount was greatly lessened by careful work the previous year. A considerable amount of Fusarium and Cladisporium was observed. The formalin treatment recommended for stinking smut should control these diseases.

The oats and barley were soaked in a formalin solution, made up of 1 pint of formalin to 40 gallons of water, for fifteen minutes.

The seed was obtained by mass selection of heads from the cereal plots of 1914, except the following new strains received from the Cerealist at Ottawa: White Fife Ottawa 11, Early Russian and White Russian and samples of registered seed of wheat, oats, and barley received from all the active members of the Canadian Seed Growers' Association in Prince Edward Island, for a comparative test of strains to see that they were following close to the different variety types.

The paths and roads were all seeded with grass and clover at the same rate as the plots. Early in August the hay was removed from the paths. Every plot was rogued twice during the growing season.

EXPERIMENTS WITH SPRING WHEAT.

There was a very heavy growth of straw and all the plots of White Russian and Early Russian lodged badly.

WHEAT.—Average of Duplicate Plots.—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days maturing.	Average length of straw including head.	Strength of straw on a scale of 10 points.	Average length of head.	Yield of grain per acre.	Yield of grain per acre.	Weight per measured bushel after cleaning
					Inch.		Inches.	Lb.	Bu. Lb.	Lb.
1	Marquis	May 17	Sept. 3	109	48	10	3	3,351	55 51	63·4
2	Huron	" 17	" 4	110	47	9·5	3·2	3,324	55 24	64·0
3	Early Russian	" 17	" 2	108	48	0·5	3·2	2,893	48 13	62·2
4	Red Fife	" 17	" 8	114	46	9·5	3	2,792	46 32	62·2
5	Early Red Fife	" 17	" 6	112	44·5	10	3	2,737	45 37	63·0
6	White Fife	" 17	" 7	113	45·5	7·5	3·2	2,721	45 21	61·1
7	White Russian	" 17	" 7	113	50·5	3	4	2,473	41 13	62·0
	The following varieties were sown in single plots:—									
1	Stanley	" 17	" 4	110	47	10	3	3,458	57 38	62·9
2	Chelsea	" 17	" 4	110	44	9	3	3,398	56 38	64·0

EXPERIMENTS WITH OATS.

Besides the regular duplicate uniform test plots, eight strains of Registered Banner oats were grown and three single plots of varieties that are not so promising as the others. The land was more uniform in character than it had been in any former year since the experimental work started at this Station, as shown by the uniformity of the duplicate tests.

OATS.—Average of Duplicate Plots.—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days maturing.	Average length of straw including head.	Strength of straw on a scale of 10 points.	Average length of bead.	Yield of grain per acre.	Yield of grain per acre.	Weight per measured bushel after cleaning
					Inch.		Inches.	Lb.	Bu. Lb.	Lb.
1	Banner	May 20	Sept. 8	111	56	1	9	3,996	117 18	33·4
2	Twentieth Century	" 18	" 3	108	53	1·5	9	3,484	102 16	36·4
3	O. A. C. 72	" 18	" 4	109	56·5	9·7	9	3,482	102 14	34·4
4	Swedish Select	" 18	" 3	108	56·5	1·5	8·5	3,459	101 25	35·2
5	Abundance	" 18	" 4	109	58·5	1·2	8·5	3,368	99 2	35·0
6	Siberian	" 18	" 3	108	56	9·7	9	3,339	98 7	36·2
7	Lincoln	" 18	" 3	108	49	10	8·2	3,289	96 25	37·3
8	Ligowo	" 18	" 3	108	46	7·5	6·7	3,255	95 25	36·0
9	Old Island Black	" 18	" 2	107	52	5	11	3,227	94 31	38·4
10	Victory	" 18	" 4	109	50·5	9·7	7·5	3,023	88 31	39·8
11	Gold Rain*	" 18	" 2	107	45	10	8	2,955	86 31	38·3
	The following varieties were sown in single plots:—									
1	Early Blossom	May 20	Sept. 8	111	52	7·5	8	3,435	101 1	37·7
2	Pioneer	" 20	" 2	105	46	10	8·2	2,749	80 29	38·0
3	Daubeney	" 20	Aug. 25	97	44	8	7·7	2,723	80 3	34·0

*Note.—Gold Rain was badly damaged by sparrows; 20% probably injured.

EXPERIMENTS WITH BARLEY.

The barley plots were uniform and made strong vigorous growth. Charlottetown No. 80, a selection from Old Island Two-row, headed the list. The character of dropping its awns in the field, together with its tendency to heavy production, make this a very desirable strain for the province.

BARLEY.—Test of Varieties.

Number	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days maturing.	Average length of straw including head.	Strength of straw on a scale of 10 points.	Average length of head.	Yield of grain per acre.	Yield of grain per acre.	Weight per measured bushel after cleaning
					Inch.		Inches.	Lb.	Bu. Lb.	Lb.
1	Charlottetown No. 80	June 2	Sept. 7	97	39	7·2	3·5	3,619	75 19	53·0
2	Gold	" 2	" 6	96	30	7	2·5	3,529	73 25	54·8
3	Swedish Chevalier	" 2	" 8	98	45	6·5	3·2	3,409	71 1	52·2
4	Stella	" 2	" 2	92	46	4	2·7	3,246	67 30	52·2
5	Trooper	" 2	" 2	92	42	7	2·5	3,199	66 31	50·2
6	O. A. C. 21	" 2	" 2	92	42	5	2·2	3,094	64 22	50·2
7	Odessa	" 2	" 2	92	43	2	2·5	3,056	63 32	51·0
8	Oderbruch	" 2	" 2	92	45	4	2·7	3,024	63 ..	51·1
9	Manchurian	" 2	" 2	92	34	5	2·2	3,006	62 30	50·8
10	Invincible	" 2	" 5	95	42	6·5	2·7	2,929	61 1	52·0
11	Nugent	" 2	" 2	92	44	6	3·0	2,920	60 40	50·0
12	Early Chevalier	" 2	" 1	91	48	0	3·0	2,846	59 14	52·3
13	Canadian Thorpe	" 2	" 5	95	42	9	2·7	2,753	57 17	53·2
14	Albert	" 2	" 2	92	35	6	2·7	2,691	56 3	50·0
15	Standwell	" 2	" 2	92	49	6	3·2	2,636	54 44	54·8
16	Beaver	" 2	" 5	95	47	8	4·0	1,959	40 39	52·0

EXPERIMENTS WITH PEAS.

The backward season was unfavourable for peas. We sowed them, however, earlier than in former years and had much larger yields than formerly. The pea weevil again did much damage to the peas while growing.

PEAS.—Test of Varieties.

Number.	Name of Variety.	Size of Pea.	Date of Sowing	Date of Ripening.	Number of days maturing.	Average length of straw.	Average length of Pod.	Yield of grain per acre.	Yield of grain per acre.	Weight per measured bushel after cleaning
						Inch.	Inch.	Lb.	Bu. Lb.	Lb.
1	Solo	Medium	May 22	Sept. 12	113	65	2·7	2,750	45 50	61·5
2	Prussian Blue	"	" 22	" 15	116	84	2·5	2,735	45 35	65·0
3	Golden Vine	Small	" 22	" 12	113	87	2·0	2,341	39 1	64·4
4	Arthur	Large	" 22	" 8	109	66	2·2	1,938	32 18	64·4

FIELD PLOTS OF CEREALS.

All available land at the Station was used in 1915 for the multiplication of the best strains of Registered grain to supply the growing demand for the very best seed. The average returns from the multiplying plots grown on the regular farm rotations were much higher than in any former year. The season was not so favourable as several former ones. The increase of the average returns was evidently due to the effect produced by the underdrainage and to the gradual improvement of the land by thorough tillage operations.

The fields of wheat did not have favourable weather conditions at harvest and the germination of these was correspondingly low. The four fields had an average germination of 65 per cent strong.

The oats and barley were saved in excellent condition for seed purposes. The average germination of the several lots of oats was 97 per cent strong and of the two lots of barley was 96 per cent strong.

These fields were carefully rogued twice during the season and all impurities and noxious weeds were removed.

Multiplying Plots of Cereals.

Spring Wheat.

Variety.	Field.	Preceding Crop.	Acreage.	Yield per Acre	
				Bush.	Lb.
Early Red Fife	C-3	Potatoes	0·57	41	36
White Fife	G-7	"	0·4	35	52
Marquis	D-2	"	1·0	27	30
"	B-4	Turnips	1·0	25	55
		Average		32	43

Oats.

Variety.	Field.	Preceding Crop.	Acreage.	Yield per Acre.	
				Bush.	Lb.
Banner	A-4	Mangels	1·0	82	..
O. A. C. 72	F-3	Turnips	0·86	67	22
Banner	B-1	Hay	1·0	60	30
"	CC-4	Mixed grain	6·0	60	1
Victory	G-5.	Hay	0·4	59	26
		Average		66	2

Charlottetown.

BARLEY.

Variety.	Field.	Preceding Crop.	Acreage.	Yield per Acre.	
				Bush.	Lb.
Charlottetown No. 80	A-2	Hay	1·0	54	43
Manchurian	F-1	"	0·86	43	4
		Average		48	47½

CO-OPERATIVE TEST OF THREE VARIETIES OF OATS.

A variety test of oats on a co-operative basis was commenced in 1912 with a number of farmers in the eastern part of the province. Three varieties were chosen and duplicate plots of one-sixtieth acre each were sown under the supervision of the Seed Division, on five farms. The grain from all of the plots was threshed and weighed at the Experimental Station.

Co-operative test of plots of oats: Test of Banner, Ligowo and Old Island Black. The average of duplicate plots is here given.

Name of Experimenter.	Location.	Yield per Acre.					
		Banner.		O. I. Black		Ligowo.	
		Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
Experimental Station	Charlottetown	117	17¾	94	31	95	25
S. M. Martin	Heatherdale	55	5	43	21	50	½
A. M. Stuart	Belle River	48	18	67	17	61	19
E. G. Giddings	Abney	46	29¾	55	12½	49	10¼
Ottis McLeod	Uigg	43	19	44	22½	45	
Norman McLeod	Bridgetown	37	15	39	5¼	44	26½
Average yield per acre, 1915		60	20½	57	28	58	21
Grand average yield per acre 1912–15 from 36 plots each variety, tested on ten farms		62	2⅓	56	1⅓	54	12

From the above data it will be seen that Banner maintains a good lead over the other two varieties. The season of 1915 was favourable for Ligowo, as shown by the fact that in four of the trials it led over Banner and in three it led over Old Island Black.

The Old Island Black is a very open-panicled oat with a much thinner hull than either of the others and commands 2 cents more per bushel in all Maritime markets than white oats. Its only failing is that its straw is fine and weak. When grown on good rich land it is liable to lodge badly.

CHARLOTTETOWN.

SESSIONAL PAPER No. 16

COMPARATIVE EXAMINATION OF STRAINS OF REGISTERED GRAIN IN THE PROVINCE.

Seven members of the Canadian Seed Growers' Association forwarded samples of the strains of registered grain that they have improved. These were grown side by side with the uniform test plots of cereals on one-sixtieth acre plots.

A meeting of the Prince Edward Island branch of the Canadian Seed Growers' Association was held in the Cereal Division of the Experimental Station on August 26, 1915. Among those present, besides the members and farmers interested in registered seed, were the Dominion Cerealist, the Secretary of the Canadian Seed Growers' Association, the Maritime Representative of the Seed Division, and the District Representative for Kings County.

A careful examination was made of all the different strains and they were found to be wonderfully uniform. The growers were complimented on the trueness of their strains.

The following data were obtained from the test:—

WHEAT.

Variety.	No. of Plots.	Average Yield of Experimental Station Plots.		Average Yield of Canadian Seed Growers Ass'n Plots.	
		Bush.	Lb.	Bush.	Lb.
White Russian	3	43	38		..
"	3	..	..	48	26
Total..	6	Average of all plots.		46	2

OATS.

Banner	5	108	24		..
"	7	.		105	26
Total	12	Average of all plots		107	..

BARLEY.

O. A. C. 21	2	64	22		..
"	2	.		66	¾
Total..	4	Average of all plots .		65	11

I wish to thank all the men who supplied this Station with samples of their registered strains of cereals, and the men who have co-operated with us, for the very careful and painstaking assistance which they have given in connection with the above tests and experiments.

CHARLOTTETOWN.

EXPERIMENTAL FARM, NAPPAN, N.S.

W. W. BAIRD, B.S.A., SUPERINTENDENT.

SEASONAL NOTES.

The winter of 1914-15 was very unsettled. From January until the last of April, 40 inches of snow and 5·89 inches of rain were recorded with much thawing and freezing. Consequently the ground was bare the greater portion of the winter.

Spring opened up very late. Wet, cold weather was experienced well on to the last of May. Rain was recorded on ten different days in April and on sixteen in May, giving in that period, 7·72 inches. The mean temperature for May was 4·31° lower than the same period for the previous year.

Seeding operations commenced on June 1. Generally speaking, that date held true for the surrounding district. A few on gravelly and sandy farms were able to get some seeding done a few days earlier; but at this Farm, even on the underdrained fields, the land was hardly in a proper tillable state until June 1, owing to the excessive amount of moisture in the soil.

During the first two weeks in June the days were fine and warm, but the nights were cool, 2° of frost being recorded on the night of the 3rd. Therefore, the soil did not warm up readily. The greater portion of the cereals was sown during this period and notwithstanding the cool nights germination was very rapid, as 50 per cent of the grain sown on the 1st appeared above the ground on the 6th and practically all was showing on the 8th. The latter part of the month was very unsettled, wet, muggy weather prevailing. Though wheat and oats continued to make a healthy growth the barley did not. The leaves turned yellow, which greatly retarded the growth.

The grasses and clovers on the sod ground and most of the new-seeded fields came through the winter in excellent shape. These made exceptionally good growth. The newly-seeded fields that did not fare so well were on exposed hillsides. Neither the timothy nor the clover on the latter fields came on until very late in the season.

July was a good growing month. The weather was fine and warm and six showers that were recorded supplied sufficient moisture to stimulate the growth of all vegetation. Owing to the bad weather conditions early in the season, roots were not seeded until July 3 and part much later, the land not being workable.

August was quite unseasonable. Much rainy weather was experienced during the early and latter parts. The total precipitation was 4·67 inches; yet the mean temperature was 2° higher than for the same period the previous year. Roots made only fair growth, chiefly due to so much wet weather and the consequent abundance of weeds and the insufficient cultivation. All cereals made good growth, but weather was most unsatisfactory for hay-making.

September was rather cool throughout. The first two weeks were very fine with much fog in the early mornings. The weather was most favourable for the ripening of grain; in fact grain ripened up too quickly with the result that it did not fill so well. A heavy rain and wind storm on the 26th did much damage in lodging grain.

October was unsettled. The thermometer dropped to 24° on the 2nd. From the 3rd to 9th the weather was dull and rainy. The remainder of the month was fairly fine and cool with frequent light showers. During the fine weather the remaining portion of the grain was stored.

November was very unfavourable throughout. Six inches of snow fell on the 6th, but was removed by a heavy rain on the 7th. Quite heavy frosts were not uncommon during the latter part. On the night of the 23rd 13° was registered. This made it very difficult in the harvesting of roots.

December for the most part was quite typical of winter. Four inches of snow fell on the 1st. From the 2nd to the 7th was very mild. Some ploughing was done during this period. From the 7th to the 9th alternate rain and snow fell. Snow was recorded again on the 18th, 24th and 26th. The remainder of the month was very fine and cold.

Typical winter weather was not experienced during January, as the snow falls and heavy frosts were always followed by a very moderate or warm period. Therefore little sledding was realized during the month; while for the greater part of February and March splendid winter weather prevailed, which greatly facilitated lumbering operations.

SOME WEATHER OBSERVATIONS TAKEN AT NAPPAN EXPERIMENTAL FARM, 1915.

Month.	Temperature.			Precipitation.			Total Sunshine.
	Highest.	Lowest	Mean.	Rainfall.	Snowfall.	Total.	
	°	°	°	Inches.	Inches.	Inches.	Hours.
January	53	−10	21·61	2·69	14·00	4·09	75·10
February	54	−14	23·64	1·01	3·00	1·31	94·70
March	48	9	26·35	.....	12·00	1·20	75·00
April	62	18	36·50	2·19	11·00	3·29	160·90
May	71	26	45·72	4·43	...	4·43	136·15
June	81	30	56·44	3·57	.....	3·57	195·00
July	81	43	62·99	1·95	.....	1·95	215·10
August	81	34	63·04	4·67	.....	4·67	186·60
September	78	32	56·49	1·47	.....	1·47	175·70
October	68	24	48·11	4·11	.....	4·11	145·60
November	57	19	38·46	4·63	...	4·63	47·90
December	52	6	28·59	3·96	8·00	4·76	64·40
Total for year				34·68	48·00	39·48	1512·15
Average for five years				30·79	54·34	36·73	1884·67
Total for six growing months, April to September				18·28	11·00	19·38	1009·45
Average for 5 years for six growing months, April to Sept.				17·74	8·50	18·59	1228·34

EXPERIMENTS WITH SPRING WHEAT.

Twelve varieties were grown in duplicate test plots of one-fortieth of an acre each. Only the named sorts are here reported on.

Seed was sown on June 1 at the rate of 1 bushel 3 pecks per acre. Due to unfavourable weather conditions, seeding was very late, much later than for the two previous years. Even on the underdrained fields the soil was unworkable as late as May 24. Consequently, the land was not ready for seeding until June 1. During the first week cool nights were experienced, yet notwithstanding this fact, the grain germinated very rapidly and made splendid growth through June, July, and August. On September 26 a very heavy wind and rain storm caused some damage by lodging the grain. The ripening was quite uneven, nor did the grain fill properly. The harvest weather was not very favourable to the proper curing and storing of grain

NAPPAN.

The following were the yields obtained:—

SPRING WHEAT.—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days maturing.	Average length of straw, including head.	Strength of straw on a scale of 10 points.	Average length of head.	Yield of grain per acre.	Yield of grain per acre.	Weight per measured bushel after cleaning.
					Inches		Inches.	Lb.	Bu. lb.	Lb.
1	Red Fife (Mackay)	June 1	Sept. 24	116	48	5	3·5	2,018	33 38	60·0
2	Red Fife (Chisholm)	" 1	" 24	116	50	8	3·5	1,838	30 38	59·0
3	Huron	" 1	" 20	112	46	10	3·0	1,770	29 30	59·0
4	White Fife	" 1	" 24	116	49	10	4·0	1,605	26 45	58·0
5	Early Red Fife	" 1	" 22	114	49	10	3·5	1,523	25 23	59·0
6	Stanley	" 1	" 24	116	50	10	3·5	1,508	25 8	58·0
7	Marquis	" 1	" 20	112	45	9	3·0	1,470	24 30	58·0
8	Red Fife	" 1	" 22	114	48	10	3·0	1,440	24 .	60·0
9	Bishop	" 1	" 22	114	45	9	3·2	1,358	22 37	58·0
10	Pioneer	" 1	" 22	114	42	6	3·0	1,283	21 23	59·5

The average yield from the plots of the named varieties was 26 bushels 21 pounds. This yield is about 11 bushels 26 pounds less than for the previous year, doubtless due to three causes: unfavourable weather conditions, lodging and the fact that the grain ripened up very quickly; therefore, the kernels were not properly filled.

AVERAGE FOR FIVE YEARS.

Seven varieties have been grown for five years, three for two years, and the two strains of Red Fife for only one year. The following table gives the named varieties grown, number of years tested, average dates of seeding and cutting, and average yield.

AVERAGE for Five Years.

	Name of Variety.	No. of Years in test.	Average date of sowing.	Average date of cutting.	Yield per acre	
					Bush.	Lb.
1	White Fife	5	May 17	Sept. 11	35	22
2	Huron	5	" 17	" 5	34	27
3	Red Fife (McKay)	1	June 1	" 22	33	37
4	Red Fife	5	May 17	" 9	33	30
5	Early Red Fife	5	" 17	" 11	32	32
6	Red Fife (Chisholm)	1	June 1	" 22	30	20
7	Stanley	5	May 17	" 8	30	20
8	Bishop	5	" 17	" 5	30	5
9	Marquis	5	" 17	" 6	29	33
10	Pioneer	2	" 26	" 17	26	3

From the above table it will be noted that White Fife gave the highest yield for the five years. The yield was 35 bushels 22 pounds. The second highest was Huron with 34 bushels 27 pounds. Though only tested for one year, the strain of Red Fife obtained from Mr. McKay gave slightly better results than the others.

The earliest date of sowing was May 6, 1913.

The latest date of sowing was June 6, 1915.

The earliest date of cutting was August 12, 1911.

NAPPAN.

The latest date of cutting was September 22, 1915.

The highest yield was obtained in 1914, from White Fife, which yielded 44 bushels 15 pounds. Bishop gave the lowest yield in 1913, namely, 20 bushels.

Though the above test shows that, taking one year with another, White Fife and Huron gave the highest average, it may be well to state that they did not always top the list. It was found that the varieties varied in position from year to year. This shows the importance of exercising all possible care in conducting such experiments, and the advisability of withholding judgment in regard to relative yields until the results of many years can be compared and averaged.

EXPERIMENTS WITH BARLEY.

A test with twelve varieties of barley was conducted in duplicate plots of one-fortieth of an acre each, six of two-row and six of six-row. The grain was sown at the rate of 2 bushels per acre on June 2. The land received the same treatment as did that for wheat. Weather conditions were more unfavourable for barley during the early stage of growth than for wheat, but it made very satisfactory growth later on and filled a little better than did the wheat, though slightly discoloured.

The following results were obtained:

BARLEY.—Test of Varieties.

Number.	Name of Variety.	Date of sowing.	Date of Ripening.	Number of days Maturing.	Average length of Straw including Head.	Strength of Straw on a scale of 10 points.	Average Length of head.	Yield of Grain per acre.	Yield of Grain per acre.	Weight per measured bushel after cleaning
					Inches		Inches.	Lb.	Bu. Lb.	Lb.
1	French Chevalier (2-row)	June 2	Sept. 13	103	42	4	4·0	2,340	48 36	50·0
2	Gold (2-row)	" 2	" 11	101	36	4	3·0	2,235	46 27	50·0
3	Invincible (2-row)	" 2	" 15	105	50	5	3·0	2,220	46 12	50·0
4	Swedish Chevalier (2-row)	" 2	" 13	103	43	3	5·0	2,130	44 18	49·0
5	Oderbruch (6-row)	" 2	" 6	96	42	3	2·5	2,070	43 6	48·0
6	O. A. C. No. 21 (6 row)	" 2	" 14	104	46	4	3·0	1,980	41 12	46·0
7	Canadian Thorpe (2-row)	" 2	" 13	103	48	5	3·0	1,950	41 2	48·0
8	Odessa (6-row)	" 2	" 6	96	42	2	2·5	1,935	40 15	48·5
9	Nugent (6-row)	" 2	" 14	104	40	5	2·7	1,905	39 33	49·0
10	Beaver (2-row)	" 2	" 15	105	46	3	3·5	1,845	38 21	50·0
11	Stella (6-row)	" 2	" 16	106	38	1	2·5	1,845	38 21	49·0
12	Manchurian (6-row)	" 2	" 14	104	46	4	3·0	1,650	34 18	47·0

The average yield of all the barley plots was 59 bushels 2 pounds per acre.

The average yield of all plots of six-rowed barley was 39 bushels 25 pounds, which is about 6 bushels less than for the previous year.

The average yield of all plots of two-row barley was 44 bushels 8 pounds. This was about 8 bushels 6 pounds less than the yield for the previous year. It may be of interest to note that the two-row varieties gave the higher average yields both in 1914 and 1915 by 6 bushels 42 pounds and 4 bushels 31 pounds, respectively.

AVERAGES FOR FIVE YEARS.

In the six varieties of six-row all have been grown for five continuous years. In the two-row barley five only have been grown for five continuous years, Gold having been grown for two years only. The following tables give the average results obtained for each, from 1911 to 1915:—

BARLEY, SIX-ROW.—Averages for Five years.

Name of Variety.	No. of years in test.	Average date of sowing.	Average date of cutting.	Yield per acre.	
				Bush.	Lb.
1. O.A.C. No. 21	5	May 17	Aug. 28	45	40
2. Nugent	5	May 17	Aug. 27	45	1
3. Stella	5	May 17	Aug. 30	42	32
4. Odessa	5	May 17	Aug. 23	41	27
5. Manchurian	5	May 17	Aug. 27	40	46
6. Oderbruch	5	May 17	Aug. 23	40	20

BARLEY, TWO-ROW.—Averages for Five Years.

Name of Variety.	No. of years in test	Average date of sowing.	Average date of cutting.	Yield per acre.	
				Bush.	Lb.
1. Swedish Chevalier	5	May 17	Aug. 29	55	38
2. French Chevalier	5	May 17	Aug. 28	54	43
3. Invincible	5	May 17	Aug. 29	44	24
4. Canadian Thorpe	5	May 17	Aug. 28	42	22
5. Beaver	5	May 17	Aug. 28	40	17
6. Gold	2	May 27	Sept. 8	20	45

From the above table it will be noted that in the six-row O.A.C. No. 21 gave the highest average yield of all varieties tested, but that Nugent was a very close second.

In the two-row, Swedish Chevalier and French Chevalier were the two highest, there being very little difference in their yields.

It is also interesting to note that in most cases the two-row varieties gave better yields than did the six-row. The earliest and latest dates of sowing and cutting were May 7, 1913; June 2, 1916; August 5, 1911; and September 16, 1915, respectively.

EXPERIMENTS WITH OATS.

Fifteen varieties of oats were tested in duplicate plots of one-fortieth of an acre in size. The seed was sown on June 2 at the rate of 3 bushels per acre. Oats, like wheat and barley, suffered to a greater or less extent from unfavourable weather conditions; perhaps not quite so much in the earlier stage, but later on from lodging. As all varieties of grain were treated for smut the percentage was greatly reduced as compared with last year.

NAPPAN.

The following were the results obtained:—

OATS.—Test of Varieties.

Number.	Name of Variety.	Date of sowing.	Date of Ripening.	Number of days maturing.	Average length of straw including head.	Strength of straw on a scale of 10 points.	Average length of head.	Yield of grain per acre.	Yield of grain per acre.	Weight per measured bushel after cleaning
					Inches.		Inches.	Lb.	Bu. Lb.	Lb.
1	Siberian	June 2	Sept. 22	112	50	3	8·0	2,580	75 30	34·0
2	Victory	" 2	" 22	112	52	4	7·0	2,520	74 4	37·0
3	Banner (McKay)	" 2	" 22	112	52	5	8·0	2,490	73 8	37·0
4	Pioneer	" 2	" 18	108	48	3	8·0	2,490	73 8	38·0
5	Banner (Chisholm)	" 2	" 22	112	52	5	8·0	2,460	72 12	37·0
6	Lincoln	" 2	" 22	112	51	2	7·0	2,415	71 11	37·0
7	Danish Island	" 2	" 20	110	54	2	8·0	2,280	67 2	35·0
8	O. A. C. No. 72	" 2	" 22	112	46	4	8·0	2,279	67 1	34·0
9	Gold Rain	" 2	" 20	110	48	3	7·0	2,250	66 6	37·0
10	Ligowo	" 2	" 20	110	50	2	7·5	2,220	65 10	34·0
11	Banner	" 2	" 20	110	55	3	8·0	2,175	63 33	35·0
12	Twentieth Century	" 2	" 21	111	50	4	7·0	2,055	60 15	35·0
13	Swedish Select	" 2	" 21	111	50	4	7·5	2,010	59 4	35·0
14	Abundance	" 2	" 20	110	54	3	7·0	1,830	53 28	34·0
15	Daubeney	" 2	" 14	104	48	2	7·0	1,440	42 22	30·0

The average yield of all plots of oats was 65 bushels 22 pounds, which is much below the average of a year ago, due principally to bad weather conditions; also to the fact that the grain ripened too rapidly to fill properly.

AVERAGES FOR FIVE YEARS.

The following are the average results obtained from eleven varieties of oats grown for five consecutive years, from 1911 to 1915, with the exception of Victory, which has been grown only four years:—

OATS.—Averages for Five Years.

Name of Variety.	No. of years in test.	Average date of sowing.	Average date of cutting.	Yield per acre.	
				Bush.	Lb.
1. Victory	4	May 19	Sept. 8	80	17
2. Pioneer	5	May 19	Aug. 28	77	22
3. Swedish Select	5	May 19	Sept. 4	76	27
4. Banner	5	May 19	Aug. 27	75	31
5. Danish Island	5	May 19	Sept. 1	75	31
6. Lincoln	5	May 19	Sept. 2	75	24
7. Twentieth Century	5	May 19	Aug. 31	75	21
8. Gold Rain	5	May 19	Aug. 31	74	22
9. Ligowo	5	May 19	Sept. 3	73	23
10. Siberian	5	May 19	Sept. 2	73	11
11. Abundance	5	May 19	Aug. 27	72	25

From the above table it will be noted that of those grown for five years Pioneer led with an average yield of 77 bushels 22 pounds, and that Swedish Select and

Banner are very close second and third. Victory for four years gave the highest, 80 bushels 17·5 pounds.

The earliest and latest dates of sowing and cutting were May 7, 1912; June 2, 1915; August 8, 1911, and September 22, 1915. The highest yield during the period was obtained from Victory, 99 bushels 24 pounds.

EXPERIMENTS WITH BUCKWHEAT.

Owing to insufficient acreage the buckwheat test was not made in duplicate. Five varieties were sown in uniform test plots of one-fortieth of an acre in size. The date of sowing was July 2, and the date of cutting September 20.

The following table gives the yields obtained:—

BUCKWHEAT.—Test of Varieties.

Number.	Name of Variety.	Date of sowing.	Date of ripening.	No. of days maturing.	Average length of straw including head.	Strength of straw on a scale of 10 points.	Yield of grain per acre.	Yield of grain per acre.	Weight per measured bushel after cleaning
					Inches.		lb	Bush. Lb.	Lb.
1	Silver Hull	July 2	Sept. 20	80	44	5	1,980	41 12	48
2	Grey	July 2	Sept. 20	80	44	4	1,960	40 40	48
3	Tartarian	July 2	Sept. 20	80	40	4	2,080	43 16	49
4	Rye	July 2	Sept. 20	80	43	6	2,120	44 8	48
5	Japanese	July 2	Sept. 20	80	45	9	2,200	45 40	46

The average of all plots of buckwheat was 43 bushels 4 ponnds. Buckwheat, unlike other varieties of grain, was not affected to the same extent by weather conditions. In fact the yields above given are on the average 11 bushels 28 pounds more than was obtained the previous season.

AVERAGES FOR FOUR YEARS.

All five varieties have been tested for four consecutive years. The following are the average results obtained from each:—

AVERAGES for Four Years.

Name of Variety.	No. of years in test.	Average date of sowing.	Average date of cutting.	Yield per acre.	
				Bush.	Lb.
1. Tartarian	4	June 8	Sept. 9	47	4
2. Silver Hull	4	" 8	" 9	44	38
3. Rye	4	" 8	" 9	42	24
4. Japanese	4	" 8	" 9	38	46
5. Grey	4	" 8	" 9	38	6

The Tartarian gave the highest with Silver Hull and Rye, second and third, respectively.

The earliest and latest dates of sowing and cutting are June 5, 1912; July 2, 1915; September 2, 1912; September 15, 1915, respectively. The highest yields were obtained in 1912, the variety being Tartarian, and yielded 47 bushels 24 pounds. Silver Hull gave the poorest yield in 1915.

PEAS.

Owing to the lateness of the season it was not considered advisable to sow peas.

FIELD CROPS OF SEED GRAIN.

Some thirteen and a half acres were sown in acre lots of wheat, oats, and barley for seed purposes.

The land was clay loam, ploughed in the fall of 1914 and thoroughly cultivated during the spring of 1915, in order to insure a perfect seed-bed. That on which the wheat was sown was the same as that on which the plot grain was sown. Part of the oats and barley were on the five year rotation. This land had received 25 tons of barnyard manure per acre in 1912, receiving nothing since but one crop of clover aftermath, which was ploughed under in the fall of 1914. The greater portion of this field is in a good state of fertility. A small portion at one end is very wet; consequently this reduced the yield considerably.

The other field on which the oats and barley were sown is under a three year rotation. This land received 15 tons of barnyard manure in 1914 and produced a crop of turnips and mangels. The east end of this field is near a shelter belt, hence it is protected from the sunshine, which results in a much poorer growth being obtained on it back to a depth of 30 feet, and consequently a lower yield per acre in grain threshed.

The following table gives the acreage of each and yields obtained:—

—	Date of seeding.	Date of ripening.	Total yield.		Yield per acre.	
			Bush.	Lb.	Bush.	Lb.
Wheat—						
1 acre Huron	June 2	Sept. 22	18	—	18	—
1 acre Red Fife	June 3	Sept. 22	15	30	15	30
¾ acre Marquis	June 3	Sept. 22	13	7	17	22
Oats—						
2 acres Banner (Ottawa)	June 4	Sept. 20	73	33	36	33
3 acres Banner (Nappan)	June 4	Sept. 20	121	37	40	23
3½ acres Ligowo	June 5	Sept. 20	101	28	29	3
1¼ acres Abundance	June 5	Sept. 20	54	14	43	18
Barley—						
1 acre French Chevalier	June 4	Sept. 18	33	—	33	—
½ acre Manchurian	June 4	Sept. 18	13	24	27	—

The seed from these acre lots of grain was put through the fanning mill twice and some of it three times; then gone over carefully by hand, thus ensuring seed grain of a high standard, which is for sale in small quantities.

EXPERIMENTAL STATION, KENTVILLE, N.S.

W. SAXBY BLAIR, SUPERINTENDENT.

THE SEASON.

The temperature during April remained fairly uniform; in fact, the mean average temperature during the latter half was the same as during the first half, and there were none of the warm drying days that usually occur during the last of April. The first half of May remained cool also, and as a result the ground did not dry out for early seeding. Seeding became quite general after the middle of May on light well-drained soils, but heavier soils were not fit for seeding until well into June. Considerable showery weather during the latter part of May and after the first week in June kept the naturally damp soil really too wet to work and much grain was put in without the soil having been thoroughly prepared, and as a consequence much of the grain came up thin.

The mean average temperature during May was 64·14° as compared with 50·72° for the same month in 1914. The temperature after the first of June was about the same as previous years. The rain was pretty evenly distributed during the summer, although the total precipitation was not as great as either 1913 or 1914. Crops did not at any time suffer for want of moisture, and, in fact, on naturally wet land there was evidence of much injury from excessive moisture.

The sunshine during the summer was not as great as in former years and this, with quite a noticeable absence of drying winds, together with a fairly even distribution of rain, accounts for the land remaining so moist during the season. The total rainfall for the six months commencing April 1 was 12·84 inches as compared with 15·67 in 1914 and 16·66 for the same period in 1913. The total hours of bright sun for the same period was 1026·5 as compared with 1159·7 in 1914 and 1232·5 in 1913.

The grain crops on the whole were lighter than one would expect from the apparently favourable season. This was in part due to the grain being thin as a result of conditions following the seeding, and in part to the general tendency of grain not to stool as much as usual. The heads although well filled were not long, and the results at threshing time were generally disappointing.

GRAIN.

The land given to cereal work this season was much more uniform than that used in previous tests, and the crop was fairly even. The soil is a light loam, and was in corn in 1914. The ground was ploughed after the corn was harvested in the fall of 1914, and the following spring was limed with 2,000 pounds ground limestone per acre which was well worked into the soil with the disc harrow and twelve-tooth two-horse cultivator. Acid phosphate at the rate of 400 pounds per acre was then applied and harrowed in. The grain was then seeded with the disc drill, and the area rolled. Soon after the grain came through, nitrate of soda at the rate of 100 pounds per acre was scattered broadcast. It will be noticed that duplicate areas of wheat were seeded at the rate of 1½ bushel and 3 bushels per acre. The object in doing this was to produce wheat for poultry rather than for seed or milling. The quality of the seed from the thick seeding was decidedly inferior to the thin seeding; it, how-

Cereal Division Building at Ottawa.

Characteristic difference in growth of Red Fife and Prelude Wheat, at Lacombe, Alberta.

Plots of Ligowo and O. A. C. 72 oats, Lacombe Experimental Station, 1915.

ever, was excellent for poultry feeding. The plots were one-half acre each. The seed was sown May 17, and the time of harvesting, character of growth, and yield per acre are given in the following table:—

GRAIN.

Variety.	Rate of seeding.	Date of seeding.	When cut.	Length of straw inches.	Weight of straw per acre.		Yield per acre.	
					Tons	Lb.	Bush.	Lb.
Wheat—								
Marquis	3 bush.	May 17	Aug. 27	40	1	1,266	23	52
"	1½ "	" 17	" 27	40	1	616	16	34
Red Fife	3 "	" 17	Sept. 3	41	1	1,034	21	56
"	1½ "	" 17	" 3	41	1	334	16	58
Oats—								
Victory	2½ "	" 17	Sept. 2	46	1	1,830	59	32
Banner, Ottawa 49	2½ "	" 17	" 2	46	1	1,413	55	2
Banner	2½ "	" 17	" 2	46	1	1,632	57	31
Daubeney	2½ "	" 17	Aug. 20	37	1	180	35	—
Barley—								
Canadian Thorpe	2 "	" 17	Aug. 27	35	1	170	21	36
Manchurian	2 "	" 17	" 20	37	1	70	22	18
Peas—								
Arthur	2½ "	" 18	Sept. 7	33	1	126	16	30
Golden Vine	2½ "	" 18	" 11	32	1	87	13	45

COMMON VETCH.

The common vetch is used very largely by the fruit grower for seeding in the orchard for a cover crop after the spring cultivation is finished. This plant seems more suitable than clover, in that it makes more rapid growth, and as it thrives better than clover on acid soils it seems better adapted for this purpose than any of the other legumes. It is also more suitable for old orchards which throw considerable shade.

The price of seed has advanced very considerably during the past few years owing to the supply from Russia being largely cut off, and it has been thought that the fruit grower might with profit grow his own seed. To get information on the question a plot of one-tenth acre was seeded to vetch on May 18. The ground on which it was grown is a sandy loam of rather low fertility, which had been in corn the previous season. The ground was limed at the rate of 1 ton ground limestone and 400 pounds of acid phosphate per acre. The growth was fair but the seed ripened unevenly. The crop was harvested September 21. The yield of seed was 79 pounds, or 13 bushels and 10 pounds per acre. About one-half of the seed was of excellent quality; the other was apparently not well matured and wrinkled considerably. It germinated 84 per cent in greenhouse soil tests. It seems that a soil of better fertility than that on which this was grown should be selected for seed production.

FLAX FOR FIBRE.

Two small plots of flax were seeded on May 18. The ground was a sandy loam of medium fertility. The crop made excellent growth. The seed was sown at the rate of 84 pounds per acre, which is the rate usually recommended for fibre. It is important that the seed should be sown thick to prevent the plants from branching, as long single stalks are desired.

The flax was pulled August 18, just as the seed pods were turning brown and before the flax was ripe enough to cut for seed. The height and yield of cured straw are given in the following table:—

Variety.	Seeded.	When pulled.	Days maturing.	Height inches.	Yield of plants dried per acre.
					Pounds.
Longstem	May 18	August 18	92	39	5,111
Novelty	" 18	" 18	92	30	4,309·5

EXPERIMENTAL STATION, FREDERICTON, N.B.

W. W. HUBBARD, SUPERINTENDENT.

The season until August was so wet as to be almost disastrous to good grain crops. April was cloudy, cold, and wet; May followed with sixteen rainy days, and at no time was any but especially well-drained land fit to cultivate and seed. Unfortunately on the Station Farm there was not much well-drained land available for grain, so seeding was very late and a good deal of the crop was drowned out after seeding by wet weather in June and July. June had twenty wet days, and July fourteen. On one of them 3·26 inches of rain fell within the twenty-four hours. From May 1 to September 1 there was a rainfall of 19 inches. The average rainfall for these five months for the last forty-one years has been 14⅓ inches. Harvesting weather was, however, warm and dry. Throughout New Brunswick generally much land intended for cereals was not seeded at all, and some was seeded so late that crops did not ripen satisfactorily.

OATS.

The principal grain crop on the Station was oats. Twenty-four and three-fifths acres were sown, all but two and a half acres were on new land very rough and very wet. The following is a statement of the field varieties:—

—	Date of seeding.	Ripe.	Acres.	Yield per acre.
				Bushels
1. Banner, N.B. seed	May 21	Sept. 13	2½	42
2. Banner	" 21–24	" 13	3¼	34·7
3. Banner, P.E.I. seed	" 31	" 20	5¼	20
4. Liowo	June 2–3	" 22	5¼	22·3
5 Ngw Market	" 3	" 23	5¾	10·8
6. Eerly Blossom	" 3	" 24	2	21
7: Baanner, Ottawa 49	" 4	" 16	⅔	53·3

Counting in 18 bushels of grain more or less mixed, the total crop threshed out 594 bushels, making an average of 24·1 bushels per acre.

Plot No. 1 covered an area in orchard under fertilizer experiment, some plots were well fertilized for last year's potatoes, others were not fertilized at all, and some plots with incomplete fertilizer.

Plot No. 2 was newly broken rough land without fertilizer of any kind, sowed broadcast and covered with drag harrow.

Plots 3, 4, 5, and 6 were also all new rough land, very uneven, and parts of it very wet. The ground was very full of roots and many boulders which prevented getting the crop off part of the area. The wet season also kept many of the low spots full of water, drowning out about 30 per cent of the crop.

Plot 7 was fertilized last year for corn. It was rather wet and could not be earlier seeded.

BUCKWHEAT.

Five acres of very wet newly cleared land were sown with 2 bushels of rough buckwheat, 2 bushels of smooth (Silver Hull) and 2 bushels of barley or rye buckwheat on the 3rd and 5th July. Part of the crop was drowned out, and not much was expected from the balance. It was cut on the 25th and 27th September, and threshed out a total of 51 bushels.

PEAS.

One bushel of Golden Vine peas, inoculated with nitro culture, was sown on one-third acre on June 8, and an equal quantity on the same area on the same date, not inoculated. No difference between the two plots could be discerned at any time and neither of them got sufficiently ripe to get them properly threshed. It was found impossible to dry the threshed grain or to compute the yield.

Arthur peas were sown on three-fifths of an acre on the 3rd June, and ripened pretty well. The yield was 18 bushels.

TEST OF VARIETIES.

Five varieties each of wheat, oats, and barley were grown on plots of one-sixtieth of an acre each. Each variety was grown in quadruplicate; four plots scattered over the area of the field being used. In this way it was hoped to overcome the special soil conditions of any one plot and make a fair test between the different varieties. The area allotted for this work needed drainage to make it independent of very wet seasons, and as this work could not be overtaken till the spring of 1915, seeding had to be delayed till the drainage was completed and the soil thoroughly cultivated.

The land was made ready by June 1, was surveyed and staked into eighty-one plots, and seeding was accomplished on the 3rd and 4th June. In 1913 the land was planted to potatoes with 750 pounds per acre of a 4-8-6 fertilizer, and in 1914 it was planted to corn with 16 tons barnyard manure per acre.

Seeding was done with a drill at the rate of 2 bushels wheat, 3 bushels oats, and 2 bushels barley per acre.

Germination was rapid and the results were as follows:—

WHEAT.

—	Date of sowing.	Date of ripening.	No. of days maturing.	Yield per acre. of grain.	Remarks.
				Bush.	
Prelude	June 3	Aug. 24	81	20	Straw and heads very short, but fine sample of grain. Slightly affected with smut.
Early Red Fife	" 3	Sept. 4	92	27	Good growth and good sample. Free from smut.
Huron	" 3.	" 4	92	28	Extra good growth, good sample grain. Badly affected with smut.
Marquis	" 3	" 4	92	15	Fair growth, straw and heads affected with fungus growth very shrunken grain. Slightly affected with smut.
Red Fife	" 3.	" 16	104	22	Good growth and fair sample grain, free from smut.

FREDERICTON.

OATS.

—	Date of sowing.	Date of ripening.	No. of days maturing.	Yield per acre of grain.	Remarks.
				Bush.	
Eighty Day	June 3	Aug. 23	80	55	Straw very short, but good heads, free from smut.
Daubeney	" 3	" 24	81	47	Straw medium with good heads, free from smut.
Banner	" 3	Sept. 16	104	58	Straw good length and fair heads, badly lodged and badly affected with smut.
Victory	" 3	" 16	104	71	Straw good length and stood up well, good heads, practically free from smut, only 5 heads being discovered.
Ligowo	" 3	" 21	109	51	Stout straw. Fair heads, no lodged, free from smut.

BARLEY.

—	Date of sowing.	Date of ripening.	No. of days maturing.	Yield per acre of grain.	Remarks.
				Bush.	
Early Chevalier	June 3	Aug. 24	81	41	Fair straw and heads, free from smut.
Gold	" 3	" 24	81	46	Short straw, good heads, slight smut.
O. A. C. 21	" 3	Sept. 1	89	43	Fair straw and heads, considerable smut.
Manchurian	" 3	" 1	89	46	Fair straw and heads, slight smut.
Canadian Thorpe	" 3	" 1	89	29	Short straw and heads, slight smut.

Two samples of flax seed were sown in small plots on 4th June, from which to test the adaptability of stalks for linen fibre. These were "Longstem" and "Novelty." On July 30 Longstem had reached a height of 36 inches and was in full blossom. Novelty at that date was only 22 inches high and just beginning to bloom; the latter grew 6 inches more by 15th August, and was not quite through blossoming when pulled, 1st October. Longstem had a height of 38 inches, and Novelty 30 inches. Sample bundles of each were forwarded to Ottawa for fibre test. The land was a sandy loam which was manured in 1914, for corn, with 16 tons barnyard manure per acre.

EXPERIMENTAL STATION, STE. ANNE DE LA POCATIERE, QUE.

JOSEPH BEGIN, SUPERINTENDENT.

Up to the present it has not been possible to carry on any variety tests of cereals, owing to the unsuitable condition of the land. We are, however, preparing a certain area for this work, and expect next spring to be able to commence a regular series of experimental plots.

Last season we sowed on our regular rotations 1 acre each of the following varieties: Marquis and Huron wheats; Daubeney and Ligowo oats; Manchurian and Success (beardless) barley; and Arthur peas. The results obtained are given below:—

Variety.	Date of sowing.	Date of ripening.	No. of days maturing.	Yield per acre.	
				Bush.	Lb.
Marquis wheat	May 19	Sept. 3	106	38	20
Huron wheat	" 19	" 5	108	41	10
Ligowo oats	" 21	" 3	103	72	15
Daubeney oats	" 21	" 1	101	79	18
Success (beardless) barley	" 29	Aug. 24	87	31	—
Manchurian barley	" 25	" 26	92	37	—
Arthur peas	" 20	Sept. 1	103	33	—

EXPERIMENTAL STATION FOR CENTRAL QUEBEC.

GUS. LANGELIER, SUPERINTENDENT.

TEMPERATURE AT CAP ROUGE IN 1915

As far as grain growing is concerned, the season can be considered one of the best in years, and yields were higher than usual in this district. Seeding operations were in full swing during the second and third weeks of May, which means that spring was about an average one for earliness. From the 16th of the above month until the 23rd of October there was not a single frost, which is unusual in this part of the country. As a whole, the five months which may be called the growing season for grain, May, June, July, August, and September, were a little warmer, drier, and duller than the average for the past three years, the mean temperature for this period being 1·07 degrees higher, the precipitation 0·67 inch less, and the number of hours of sunshine 5·2 fewer than during 1912-13-14.

INVESTIGATIONS WITH GRAIN.

Investigations with grain at this Station comprise: (1) tests of different varieties of spring wheat, barley, oats, peas, flax, to find out their relative yielding power and earliness; (2) the improvement of the leading kinds by selection; (3) the production of seed under field conditions; (4) the comparison of different mixtures for live stock feed; (5) the growing of grain for hay production.

VARIETY TESTS.

The trial plots, all in duplicate, are of one-sixtieth acre and come in a regular three-year rotation of hoed crop, grain and hay. They are on a uniform though rather poor piece of sandy loam with shale about eighteen inches from the surface. The land gets an application of 20 tons of barn yard manure every three years; it was ploughed in October 1914 and double disced twice, harrowed, rolled, and sown with a drill on May 17 and 18. All the plots were rogued and kept clean during the growing season. The grain was not hurt by disease, lodging, or pests; it was cut by hand, and threshed in a specially constructed and easily cleaned machine.

SPRING WHEAT.

Eight varieties were tested: Bishop, Chelsea, Early Red Fife, Early Russian, Huron, Marquis, Prelude, Red ife. The highest yielder was Chelsea, tried here this season for the first time; it gave 1,738 pounds of grain per acre, and matured in ninety-three days. The earliest was Prelude, which ripened in eighty-five days, and gave 1,508 pounds of grain per acre. The average of five years places Huron first with 1,406 pounds per acre; during that period, it was just two days later to ripen than Marquis, which only gave 1,049 pounds per acre. Huron is a bearded variety, and its baking qualities are not of the very best, but it is unquestionably the highest yielder of any

variety tried here since 1911, and it is the spring wheat which seems best adapted to central Quebec. The average yield for the eight varieties tried in 1915 was 1,435 pounds per acre, and the average number of days to come to maturity was ninety-four.

The following tables give details about results of 1915 and also about all varieties tested during three years or more:—

Number	Name of variety.	Date of sowing.	Date of ripening.	No. of days maturing.	Average length of straw including head.	Strength of straw on a scale of 10 points.	Average length of head.	Yield of grain per acre.	Yield of grain per acre.
					Inches.		Inches.	Lb.	Bu. lb.
1	Chelsea	May 18	Aug. 19	93	33	10	3·5	1,738	28 58
2	Prelude	" 18	" 11	85	30	9	2·5	1,508	25 8
3	Huron	" 17	" 18	93	31	10	3·3	1,488	24 48
4	Early Red Fife	" 18	" 23	97	33	10	3·5	1,485	24 45
5	Marquis	" 18	" 26	100	28	10	3·0	1,332	22 12
6	Early Russian	" 17	" 20	95	30	10	3·0	1,320	22 ..
7	Bishop	" 17	" 19	94	32	10	3·3	1,305	21 45
8	Red Fife	" 18	" 28	102	28	10	2·7	1,305	21 45

Rank for yield	Name of variety.	Number of years under test.	Average number of days maturing.	Average yield of grain per acre.	Average yield of grain per acre.	Years under test.	Remarks
				Lb.	Bush. lb.		
1	Huron	5	101	1,406	23 26	1911-2-3-4-5	
2	Preston	3	101	1,315	21 55	1911-12-13	
3	Bishop	3	96	1,245	20 45	1911-12-15	Total failure in 1913
4	Early Red Fife	5	102	1,127	18 47	1911-2-3-4-5	
5	Marquis	4	99	1,049	17 29	1911-2-4-5	"
6	Red Fife	4	101	831	13 51	1911-2-4-5	"
7	Yellow Cross	3	99	825	13 45	1911-2-3	

OATS.

Six varieties were tested: Banner, Daubeney, Eighty Day, Gold Rain, Ligowo, Victory. The highest yielder was Banner with 2,404 pounds per acre, and it matured in ninety-two days. The earliest was Eighty Day which ripened in eighty days, but it was the lowest yielder with 1,758 pounds per acre. The average of five years places Banner first with 2,381 pounds per acre, but it is eleven days later than Eighty Day, which gave 1,830 pounds per acre. Banner is unquestionably the best variety of oats for this district and is strongly recommended. The average yield for the six varieties tried in 1915 was 2,092 pounds per acre, and the average number of days to come to maturity was eighty-nine.

The following tables give details about results of 1915, and also about all varieties tested during three years or more:—

Number.	Name of variety.	Date of sowing.	Date of ripening.	No. of days maturing.	Average length of straw including head.	Strength of straw on a scale of 10 points.	Average length of head.	Yield of grain per acre.	Yield of grain per acre.
					Inches.		Inches.	Lb.	Bu. Lb.
1	Banner	May 18	Aug. 18	92	40	10	8·0	2,404	70 24
2	Gold Rain	" 18	" 17	91	38	10	8·0	2,244	66 .
3	Ligowo	" 17	" 17	92	34	10	7·5	2,185	64 9
4	Victory	" 17	" 17	92	37	10	7·3	1,997	58 25
5	Daubeney	" 18	" 10	84	31	10	7·0	1,965	57 24
6	Eighty Day	" 17	" 6	80	29	10	6·0	1,758	51 24

OATS, 1911-15.

Number.	Name of variety.	Number of years under test.	Average number of days maturing.	Average yield of grain per acre.	Average yield of grain per acre.	Years under test.	Remarks.
				Lb.	Bush. Lb.		
1	Banner	4	96	2,381	70 1	1911-13-14-15	Did not ripen in 1912.
2	Gold Rain	5	99	2,299	67 21	1911-12-13-14-15	
3	Victory	4	95	2,199	64 23	1911-13-14-15	Did not ripen in 1912.
4	Daubeney	5	90	2,017	59 11	1911-12-13-14-15	
5	Siberian	3	107	1,980	58 8	1911-12-13	
6	Ligowo	5	102	1,950	57 12	1911-12-13-14-15	
7	Twentieth Century	3	106	1,890	55 20	1911-12-13	
8	Eighty Day	5	87	1,830	53 28	1911-12-13-14-15	
9	Abundance	3	106	1,765	51 31	1911-12-13	
10	Thousand Dollar	3	106	1,550	45 20	1911-12-13	

FIELD PEAS.

Five varieties were tested: Arthur, English Grey, Golden Vine, Prussian Blue, Solo. The highest yielder was Solo, tried here this season for the first time; it gave 1,800 pounds of grain per acre and matured in ninety-two days. The earliest was Golden Vine which ripened a day earlier and gave 1,779 pounds of grain per acre. The average of five years places Arthur at the top with 1,966 pounds per acre and it was just a day later than Golden Vine which gave 1,778 pounds per acre. Arthur is recommended to farmers of Central Quebec, as it does very well here. The average yield for the five varieties tried in 1915 was 1,629 pounds of grain per acre and the average number of days to come to maturity was ninety-five.

The following tables give details about results of 1915 and also about all varieties tested during three years or more:—

Number.	Name of variety.	Size of pea.	Date of sowing.	Date of ripening.	Number of days maturing.	Average length of straw.	Average length of pod.	Yield of grain per acre.	Yield of grain per acre.
						Inches.	Inches.	Lb.	Bu. Lb.
1	Solo	Medium	May 17	Aug. 17	92	28	2·2	1,800	30 ..
2	Golden Vine	Small...	" 18	" 17	91	26	1·7	1,779	29 39
3	English Grey	Medium	" 18	" 24	98	30	2·0	1,590	26 30
4	Arthur Selected	"	" 17	" 17	92	34	2·5	1,564	26 4
5	Prussian Blue	"	" 18	" 24	98	32	2·0	1,410	23 30

FIELD PEAS, 1911-15.

Rank for yield.	Name of variety.	Number of years under test.	Average number of days maturing.	Average yield of grain per acre.	Average yield of grain per acre.	Years under test.	Remarks.
				Lb.	Bush. Lb.		
1	Arthur	4	99	1,966	32 46	1911-13-14-15	Destroyed by aphis in 1912.
2	English Grey	4	102	1,832	30 32	1911-13-14-15	"
3	Golden Vine	4	98	1,778	29 38	1911-13-14-15	"
4	Prussian Blue	4	102	1,464	24 24	1911-13-14-15	"

BARLEY

Five varieties were tested (the figure 2 follows the names of the two-rowed and 6 that of the six-rowed): Early Chevalier (2), Gold (2), Manchurian (6), O.A.C. 21 (6), Success (6). The highest yielder was Manchurian, which gave 1,942 pounds per acre and ripened its grain in eighty-one days. The earliest, as usual, was Success, which came to maturity in seventy-seven days with a yield of 1,743 pounds per acre. Manchurian, to the present, seems the best adapted to this district and is recommended to farmers.

CAP ROUGE.

The following table gives details about results of 1915. No figures are given for the past five years, because this crop has practically been a failure until 1914:—

Number.	Name of variety.	Date of sowing.	Date of ripening.	No. of days maturing.	Average length of straw including head.	Strength of straw on a scale of 10 points.	Average length of head.	Yield of grain per acre.	Yield of grain per acre.
					Inches.		Inches.	Lb.	Bu. Lb.
1	Manchurian, 6 row	May 18	Aug. 7	81	30	10	2·5	1,942	40 22
2	Early Chevalier, 2 row	" 17	" 5	80	32	10	3·5	1,905	39 33
3	Gold, 2 row	" 17	" 11	86	21	10	2·5	1,744	36 16
4	Success, 6 row	" 18	" 3	77	27	9	2·5	1,743	36 15
5	O. A. C. No. 21, 6 row	" 18	" 9	83	27	10	3·0	1,717	35 37

FLAX.

Two varieties were grown: Longstem and Novelty. The first mentioned was ripe in 106 days and gave 664 pounds of seed to the acre, whilst the last was ripe two days later but gave 878 pounds of seed per acre. The average length of the plants was 35 inches for Longstem and 22 for Novelty. It seems by this one trial that one variety would be more suitable for fibre whilst the other would give more seed.

The following table gives details for 1915, the first year that flax was tried at this Station:—

Number.	Name of variety.	Date of sowing.	Date of ripening.	Number of days maturing.	Average length of plants.	Yield of seed per acre.	Yield of seed per acre.
					Inches.	Lb.	Bu. Lb.
1	Longstem	May 20	Sept. 3	106	35	664	11 43
2	Novelty	" 20	" 5	108	22	878	15 38

PLANT BREEDING.

Work was continued in isolating the heaviest yielding strains of Banner oats, Huron wheat, Manchurian barley, and Arthur peas. As supposedly pure lines were used to start with, it is not expected that any extraordinary results will be obtained. But it is hoped that by using rather easy methods of selection, a few good farmers in many localities can be induced to do the same, thus avoiding the haphazard way of buying new seed every two or three years. By 1917, both Banner oats and Huron wheat from the Station's selection will be tried in the variety tests.

CAP ROUGE.

SEED GROWING.

Huron wheat, Manchurian barley, Arthur peas, and Banner oats are the varieties which have done best here and which are recommended to the farmers of central Quebec. Every year, a couple of acres of the three former, and from 10 to 20 acres of the latter are grown especially for seed, with the utmost care. The fields are kept free of weeds and rogued during the growing season. Stook covers are used to prevent discolouration of the grain, a specially constructed and easily cleaned machine does the threshing, a regular fanning mill and a Marot grader clean and classify the seed which is put up in neat bags with the name of the Station printed on them and sealed so that no pilfering can take place. This entails lots of work, but farmers who buy seed at this Station derive a great benefit from this and it is hoped that the more careful ones will grow and sell grain in their locality, thus spreading the good work started here. This is all the more important because good seed grain is unfortunately the exception in central Quebec. That the painstaking work undertaken at this Station is appreciated can easily be seen by the fact that many orders for seed had to be refused, the supply being early exhausted. The prices at which it is sold are as follows: Banner oats, $1 per bushel of 34 pounds; Huron wheat, $1.75 per bushel of 60 pounds; Manchurian barley, $1.50 per bushel of 48 pounds; Arthur peas, $2.50 per bushel of 60 pounds.

MIXTURES FOR GRAIN PRODUCTION.

This seems to be a vexed question as some farmers are sure that they get more pounds per acre by sowing two or three kinds of grain together than they would with only one, whilst others say that for stock feeding, especially, it is very seldom that the cereals used in the mixtures can be fed together to the same class of stock with advantage, and that it is better to sow them separately and mix them afterwards as required.

In 1915, the mixtures did not yield more than the single varieties, but it seems better to await the results of at least two or three years before giving figures.

GROWING GRAIN FOR HAY PRODUCTION.

For different reasons, it happens that sometimes meadows are much poorer than usual and farmers look to a crop which can be grown for hay in a single season. Different varieties of oats, also mixtures were used for this purpose in 1915 with the following results:—

Oats,	Gold Rain	7,200	pounds	hay per acre.
"	Victory	6,126	"	" "
"	Banner, and vetches	6,060	"	" "
"	Banner, with vetches and peas	4,680	"	" "
"	Banner	4,440	"	" "
"	Ligowo	3,960	"	" "
"	Banner, and Peas, Golden Vine	3,368	"	" "

All the above were grown on one-sixtieth acre plots. Admitting that, possibly, the crop would be better on a small chosen area than on a larger one, it is interesting to note that, during the same season, hay averaged only 3,006 pounds per acre at this Station, under field conditions.

CAP ROUGE.

According to Henry, cured hay from different sources contains the following quantities of digestible nutrients per 100 pounds:—

Feed.	Total dry matter.	Crude protein.	Carbohydrates.	Fat.
Timothy	86·8	2·8	42·4	1·3
Red clover	84·7	7·1	37·8	1·8
Mixed grasses and clover	87·1	5·8	41·8	1·3
Oat	86·0	4·7	36·7	1·7
Oat and Pea	89·5	7·6	41·5	1·5
Oat and Vetches	85·0	8·3	35·8	1·3

With these figures we come to the following conclusions for 1915, as to the number of pounds of digestible nutrients produced per acre, from hay of different kinds:—

Hay.	Yield of hay per acre.	Total dry matter.	Digestible nutrients per acre.		
			Crude protein.	Carbohydrates.	Fat.
	Lb.	Lb.	Lb.	Lb.	Lb.
Banner oats and vetches	6060	5151·0	502·98	2669·48	78·78
Oats, Gold Rain	7200	6192·0	338·40	2642·4	122·4
" Victory	6120	5263·0	287·64	2246·04	104·04
Banner oats and Goldea Vine peas	3360	3007·2	255·00	1394·40	50·40
All hay from oats	5415	4656·9	254·505	1987·305	92·05
Clover	3085	2612·59	219·035	1166·13	55·53
Oats, Banner	4440	3818·4	207·68	1628·48	74·48
" Ligowo	3900	3354·0	183·30	1431·30	66·30
Timothy	2923	2537·16	81·84	1239·35	37·999

The most interesting results of this experiment are that hay can easily be grown in a single season from oats, or from oats mixed with a leguminous plant such as field peas and vetches, also that the hay thus grown contains a great many more pounds of digestible nutrients per acre, especially the valuable protein, than do clover or timothy. To offset this great advantage, there is the extra cost of growing the oats or the mixtures, also the fact that these must be considered catch crops, as they are generally seeded too heavily to permit a fair growth of clover or timothy with them. A few years' trials will no doubt throw more light on all these points.

MISCELLANEOUS.

DIFFERENT CEREALS AS PRODUCERS OF DIGESTIBLE NUTRIENTS.

A comparison of the different kinds of cereals as producers of digestible nutrients per acre is interesting and the following table takes in every plot of the variety tests since five years:—

DIGESTIBLE Nutrients furnished by different Grains per acre.—Average of 5 years.

Kind of grain.	Number of plots.	Grain per acre.	Dry matter per acre.	Digestible nutrients per acre.		
				Protein.	Carbohydrates.	Fat.
		Lb.	Lb.	Lb.	Lb.	Lb.
Peas	38	1723	1464·550	339·431	849·439	6·89
Oats	58	2028	1817·088	216·996	1020·084	77·06
Barley	45	1020	909·840	85·680	666·06	16·32
Wheat	59	1066	954·070	82·708	719·55	15·99

On account of certain peculiarities of soil, barley and wheat did not do as well as they should until 1914, and it is possible that a few more years may bring them into better positions. An important point is to find field peas at the head of the list; they certainly deserve more consideration than they are now getting.

EXHIBITIONS.

Grain grown at this Station was exhibited at eleven different places during the fiscal year: at four New England Fairs (for the Department of Interior) and at seven shows in the province of Quebec. The exhibit at the Quebec Seed Fair elicited much praise, and can be truthfully said to have been very good.

CAP ROUGE.

EXPERIMENTAL STATION, LENNOXVILLE, QUE.

J. A. McCLARY, SUPERINTENDENT.

Regular experimental work in the testing of different kinds of grain has not been started at this Station, but approximately 15 acres have been set apart for cereal work. This land was broken up in the fall of 1915, so as to be able to start a three year rotation which will be followed for cereal work. For the first year, one-third will be plotted off into one-sixtieth acre plots and all sown to one variety. One-third will be in hoed crop this year; the remainder will be sown to clover and ploughed down. During the past year the main crop consisted of 48 acres of Banner oats, which yielded 26 bushels per acre. Eight acres of Marquis wheat were sown in the cultural orchard.

EXPERIMENTAL FARM, BRANDON, MAN.

W. C. McKILLICAN, B.S.A., SUPERINTENDENT.

The season of 1915 opened with an early spring and favourable weather for seeding, which was completed at an early date. Then there came a long period of cold weather. There were repeated hard frosts during May and until about the 20th of June, and even July was comparatively cold. During May and June the grain appeared to be making slow progress, but it was getting well rooted so that it was able to make rapid development when favourable weather came.

The season was a dry one; the total rainfall up to the end of August being only 8½ inches. Though this is considerably below average, it came when most needed, and, on account of the cool weather, an inch of rain seems to have been worth more than in a year of greater heat and sunshine. August was a fine warm month, and the crop ripened up quickly. Yields were above average all through Manitoba and on the experimental plots here some unusually high yields were obtained.

SPRING WHEAT.

Only three named varieties of wheat were tested this year. In addition eleven new sorts originated by the Dominion Cerealist were tried out in comparison with the standard varieties, but no public report is being made on them at present. The land used for wheat plots is heavy clay loam, and was summer-fallowed the previous year. Two one-fortieth acre plots of each variety were sown. The date of seeding was April 15 for all plots, and the rate of seeding, 1¾ bushels per acre. The results are shown in tabular form as follows:—

TEST of Varieties.—Wheat.

Number.	Name of Variety.	Date of sowing.	Date of ripening.	Number of days maturing.	Average length of straw, including head.	Strength of straw on a scale of 10 points.	Average Length of head.	Yield of Straw per Acre.	Yield of Grain per Acre.	Weight per measured bushel after cleaning.
					Inches		Inches.	Lb.	Bu. lb.	Lb.
1	Marquis	April 15	Aug. 20	125	48	3	3·5	8,660	62 ..	64 0
2	Prelude	" 15	" 12	117	42	9	1·2	6·230	49 50	64·5
3	Red Fife	" 15	" 24	129	50	1	3·2	10,130	36 50	62·0

Five-Year Averages.

The average results with these varieties are as follows:—

Variety.	Average No. of days maturing.	Average Yield per acre.
		Bush. Lb.
Marquis	108·8	46 35
Red Fife	114·6	36 37
Prelude	98·0	30 17

Marquis has now clearly demoustrated its superiority over Red Fife for most districts in Manitoba. Not only has it surpassed the older variety year after year in these tests, but in practical farm trials it has done equally as well and is now rapidly establishing itself as the main crop of Western Canada. The chief merit of Prelude is its earliness; though it has yielded well in this cool season, it has never done so here before. It is recommended only for districts that are too frosty to grow Marquis. It has faults that make it undesirable where Marquis or Red Fife can be grown successfully.

OATS.

Fifteen varieties of oats were tested this year. Two plots of each variety were sown on land similar to that used for wheat, and similarly prepared. The oats were sown on April 28 at 2½ bushels per acre. The results were as follows:—

Test of Varieties.—Oats.

Number.	Name of Variety.	Date of sowing.	Date of Ripening.	Number of days maturing.	Average Length of Straw including head.	Strength of Straw on a scale of 10 points.	Average Length of head.	Yield of Straw per Acre.	Yield of Grain per Acre.	Weight per measured bushel after cleaning.
					Inches		Inches.	Lb.	Bu. lb.	Lb.
1	Orloff	April 28	Aug. 13	107	46	0	7·0	7,385	141 1	36·5
2	Ligowo	" 28	" 25	119	55	0	8·0	9,315	137 27	40·0
3	Abundance Regenerated	" 28	" 23	117	57	0	8·5	8,990	136 6	42·0
4	Daubeney	" 28	" 11	105	46	0	7·0	7,775	135 25	39·5
5	Banner	" 28	" 24	118	57	0	9·0	9,105	134 19	39·5
6	Gold Rain	" 28	" 22	116	57	0	8·5	9,430	132 22	42·5
7	Newmarket	" 28	" 24	118	57	0	8·5	8,650	131 16	39·5
8	Great Freneh Lizo	" 28	" 23	117	56	0	8·5	8,810	131 16	40·5
9	Twentieth Century	" 28	" 26	120	56	0	9·0	9,290	130 30	41·7
10	Green Russian	" 28	" 21	117	54	0	8·0	8,580	130 ..	38·7
11	Eighty Day	" 28	" 12	106	46	0	7·0	6,910	128 24	36·5
12	Victory (Seger)	" 28	" 27	121	56	0	8·5	9,700	118 28	42·2
13	Swedish Select	" 28	" 25	119	57	0	8·5	8,340	117 22	41·5
14	Garton's No. 22	" 28	" 23	117	59	0	9·5	8,850	111 1	42·0
15	O. A. C. No. 72	" 28	" 29	123	60	0	9·5	8,470	108 33	42·0

These oat plots were all lodged by a heavy storm of wind and rain about July 22. They were uniformly and completely knocked to the ground, and it was therefore impossible to observe any differences in strength of straw. Probably on account of being better filled before getting lodged, the early varieties have shown up usually well in yield.

Great French Lizo is the only new variety in this list. It has been included at the request of one of the best known western seed firms. Siberian is dropped from the list this year, as it has shown no outstanding merit for this climate and has been superseded by O.A.C. No. 72 in the recommendations of the institution (Ontario Agricultural College) which introduced it.

FIVE-YEAR Averages.

Variet .	Average of days Maturing.	Average Yield per Acre.	
		Bush.	Lb.
Gold Rain	104·0	102	17
Banner	105·4	102	17
Twentieth Century	106·6	101	17
Ligowo	106·2	100	9
Orloff	94·4	100	5
Daubeney	95·0	99	3
Victory (Seger)	106·0	98	..
Swedish Select	105·8	97	10
Abundance, Regenerated	105·0	92	29
Newmarket (average of 4 years)	107·7	102	28
Garton's No. 22 (average of 4 years)	107·5	88	19
O. A. C. No. 72 (average of 3 years)	107·3	91	26

It will be observed that there is very little difference in the average yield of the first eight varieties. However, the Banner variety which is the old standard sort in Manitoba is not surpassed by any, and may safely be recommended for general use. Gold Rain equals it in average yield, and being a little earlier, has been given first place on this list. It is a very desirable variety of yellow oat. For districts that require an earlier-maturing oat, the Orloff and Daubeney varieties are recommended.

BARLEY.

Eleven varieties of barley tested this year are reported herewith. In addition, five new sorts originated by the Dominion Cerealist were tried but are not reported upon, until more thoroughly tested. The barley plots were on heavy clay loam which produced a crop of potatoes the previous year. May 11 was the date on which all the plots were sown, and the rate of seeding was 2 bushels per acre. The results are reported in tabular form as follows:—

TEST of Varieties.—Barley.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days maturing.	Average Length of Straw including Head.	Strength of Straw on a scale of 10 points.	Average Length of head.	Yield of Straw per Acre.	Yield of Grain per Acre.	Weight per measured bushel after cleaning.
					Inches		Inches.	Lb.	Bu. lb.	Lb.
1	Gold (2-row)	May 11	Aug. 14	95	31	8	3·2	3,670	84 38	55·0
2	Garton's No. 68 (6-row)	" 11	" 10	91	39	8	3·0	5,435	83 42	51·0
3	Mensury (6-row)	" 11	" 10	91	39	9	3·0	4,895	78 41	49·0
4	Manchurian (6-row)	" 11	" 11	92	39	10	3·2	5,105	77 19	49·0
5	Guymalaye (Guy Mayle) (6 row)	" 11	" 11	92	33	2	2·5	5,200	72 24	53·0
6	Success (6-row)	" 11	" 8	89	39	6	3·0	4,450	69 38	50·0
7	Swedish Chevalier (2-row)	" 11	" 17	98	41	6	3·2	5,080	67 24	52·0
8	Canadian Thorpe (2-row)	" 11	" 15	96	38	8	2·7	4,905	66 7	52·0
9	Odessa (6-row)	" 11	" 11	92	39	10	3·0	4,660	61 32	49·0
10	O. A. C. No. 21 (6-row)	" 11	" 13	94	39	6	3·0	5,390	58 26	49·5
11	Beaver (2-row)	" 11	" 14	95	46	8	5·5	5,340	47 42	48·0

Gold is an unusually productive two-rowed variety, originated at the Svalöf station in Sweden. It is very short in the straw and comparatively strong for a two-row variety. Garton's No. 68 and Mensury or Manchurian, which are practically identical, are the varieties of six-row barley which have done best here, not only this year, but for several years. They are recommended for general use.

Mansfield, a variety tested here for many years, has been discarded on account of comparing unfavourably in point of yield with the best sorts. Brewer has been dropped for very weak straw.

FIVE-YEAR Averages.

Variety.	Average strength of Straw.	Average No. of days maturing.	Average Yield per acre.
			Bush. Lb.
Mensury	Fairly strong	87·6	74 7
Manchurian	Strong	88·8	72 20
Gold	Medium	95·0	71 23
O. A. C. No. 21	Fairly strong	87·4	66 37
Odessa	Fairly strong	89·2	62 33
Canadian Thorpe	Medium	95·2	60 34
Swedish Chevalier	Very weak	98·2	60 3
Beaver	Fairly strong	93·2	46 35
Garton's No. 68 (Average of 4 years)	"	88·7	76 9
Guymalaye (Guy Mayle) (Average of 4 years)	"	87·5	58 41
Success (Average of 4 years)	"	84·2	55 42

FLAX.

Nine varieties of flax were tested this year. The land used is a sandy loam and was summer-fallowed the previous year. The flax was sown on May 1, at the rate of one-half bushel per acre. The results are as follows:—

TEST of Varieties.—Flax.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Average Length of Plants.	Yield of Seed per acre.	Weight per measured bushel after Cleaning.
					Inches.	Bu. lb.	Lb.
1	Primost	May 1	Aug. 11	102	29	31 11	55·0
2	La Plata	" 1	" 23	114	19	31 11	55·0
3	Golden	" 1	" 24	115	18	29 26	55·0
4	Novelty	" 1	" 19	110	26	28 27	54·5
5	N. D. R. No. 52	" 1	" 16	103	27	28 2	55·0
6	N. D. R. No. 73	" 1	" 17	108	27	27 42	55·0
7	N. D. R. No. 114	" 1	" 15	106	27	25 50	56·0
8	Common	" 1	" 13	104	29	24 26	56·0
9	Longstem	" 1	" 16	107	44	17 38	54·0

Novelty and Longstem are two new varieties from the Dominion Cerealist, the latter is selected specially for length of stem for fibre production.

THREE-YEAR Averages.

Seven of these varieties have been grown for three years with the following average results:—

Variety.	Average days Maturing.	Average Yield per Acre.
		Bush. Lb.
N. D. R. No. 52	99·7	22 38
Primost	100·3	22 20
N. D. R. No. 114	98·7	21 46
N. D. R. No. 73	100·7	21 44
La Plata	108·3	20 46
Golden	109·7	19 31
Common	99·0	17 38

N. D. R. No. 52, originated at the North Dakota Agricultural College, has given the best average results, is a good variety in every way and is highly recommended. Primost has given very nearly as good results, and is also recommended.

BRANDON.

PEAS.

Eight varieties of field peas were tested this year. They were sown on April 15. The soil is sandy loam and was summer-fallowed the previous year. The rate of seeding varied from 1¾ to 2½ bushels per acre, depending on the size of the peas. The following are the results obtained:—

TEST of Varieties.—Peas.

Number.	Number of Variety	Size of Pea.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Average Length of Straw.	Average Length of Pod.	Yield of Grain per Acre.	Weight per measured bushel after Cleaning.
						In.	In.	Bu. lb.	Lb.
1	Prince	Medium	April 15	Aug. 23	130	48	2·0	59 20	61·0
2	Prussian Blue	"	" 15	" 23	130	52	2·0	57 20	62·0
3	Golden Vine	Small	" 15	" 23	130	50	2·0	57 10	61·0
4	Mackay	Medium	" 15	" 24	131	48	2·0	55 90	61·0
5	Chancellor	Small	" 15	" 22	129	44	2·0	52 10	60·5
6	English Gray	Medium	" 15	" 23	130	49	2·5	52 ..	61·0
7	Arthur	Large	" 15	" 20	127	32	2·5	45 ..	61·0
8	Solo	Medium	" 15	" 21	128	46	2·5	44 40	62·0

FIVE-YEAR Averages.

These varieties have all been grown for at least five years. The average results for that period are as follows:—

Variety.	Average No. of Days Maturing.	Average Yield per Acre.	
		Bush.	Lb.
Prince	120·6	44	51
Mackay	121·0	43	50
Solo	117·4	43	16
Prussian Blue	119·8	43	1
English Gray	121·2	40	24
Chancellor	118·6	39	24
Golden Vine	120·2	38	54
Arthur	114·6	38	51

Prince and Mackay are practically identical; they are the heaviest yielders but are somewhat late. Arthur, though the lightest yielder on the average, is desirable for heavy, rich land, on account of its earliness and its short straw.

INFLUENCE OF ENVIRONMENT ON SEED OATS.

The experiment that has been conducted for a number of years in co-operation with three American Experiment Stations in regard to the influence on seed oats of the climate in which they are grown, has been continued. Oats, originally of the same stock, but grown since 1911 at the four places indicated, were sown here side by side. The results this year were as follows:—

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average length of Straw including Head	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Weight per measured bushel after cleaning.
				In.		In.	Bush. lb.	Lb.
Swedish Select (Brandon Seed)....	April 28	Aug. 25..	119	57	0	8·5	117 22	41·5
Swedish Select (Ohio Seed).....	" 28	" 23	117	54	0	8·0	117 12	41·5
Swedish Select (Wisconsin Seed)..	" 28	" 24	118	54	0	8·0	116 16	41·5
Swedish Select (South Dakota)...	" 28	" 22	116	53	0	8·0	110 ..	41·5

EXPERIMENTAL FARM, INDIAN HEAD, SASK.

W. H. GIBSON, B.S.A., SUPERINTENDENT.

THE SEASON.

Generally speaking the season of 1915 was favourable to the production of maximum cereal crops. The spring opened early, with the land in good tilth, and seeding commenced on April 6. Sufficient rain fell throughout May and June to keep the grain crop growing steadily throughout the season.

During the past season tests were made of the following cereal crops: Fifteen varieties of spring wheat, fourteen varieties of oats, twenty varieties of barley, eight varieties of field peas, and three varieties of flax.

WINTER WHEAT.

One plot of winter wheat was sown August 29. The entire plot winter-killed.

SPRING WHEAT.

Fifteen varieties, including eleven unnamed sorts, were sown April 14, in plots one-fortieth of an acre each, at the rate of 1½ bushels per acre. Only the named varieties are recorded here.

SPRING WHEAT.—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Average Length of Straw including Head.	Strength of Straw on a Scale of 10 points.	Average Length of Head.	Yield of Grain Per Acre.	Yield of Grain Per Acre.		Weight per Measured Bushel after Cleaning.
					In.		In.	Lb.	Bush.	lb.	Lb.
1	Marquis	April 14	Aug. 21	129	47	10	3·0	3,880	64	40	63·4
2	Pioneer	" 14	" 20	128	44	6	2·5	2,980	49	40	62·5
3	Prelude	" 14	" 12	120	43	10	2·2	2,860	47	40	63·5
4	Red Fife	" 13	" 31	140	41	10	2·7	2,220	37	..	62·1

OATS.

Fourteen varieties of oats were sown in 1915 on land that had been summer-fallowed the previous year. Seeded April 29 in plots one-fortieth of an acre. Rate of seeding 2 bushels per acre.

OATS.—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Average Length of Straw including Head.	Strength of Straw on a Scale of 10 points.	Average Length of Head.	Yield of Grain Per Acre.	Yield of Grain Per Acre.		Weight per Measured Bushel after Cleaning.
					In.		In.	Lb.	Bush.	lb.	Lb.
1	Eighty Day	April 29	Aug. 10	103	42	10	6·5	5,040	148	8	35·5
2	Gold Rain	" 29	" 20	113	53	7	7·0	5,000	147	2	42·4
3	Daubeney	" 29	" 16	109	43	10	6·0	4,900	144	4	38·0
4	Danish Island	" 29	" 23	116	52	8	8·0	4,880	143	18	40·0
5	Victory	" 29	" 22	115	55	9	8·0	4,640	136	16	42·0
6	Twentieth Century	" 29	" 22	115	54	9	8·5	4,640	136	16	41·1
7	Swedish Select	" 29	" 22	115	52	9	7·5	4,400	129	14	41·1
8	O .A. C. 72	" 29	" 22	115	55	10	9·0	4,400	129	14	38·8
9	French Lizo	" 30	" 19	112	56	7	9·0	4,360	128	8	40·4
10	Banner	" 29	" 22	115	52	8	7·5	4,280	125	30	41·0
11	Ligowo	" 29	" 20	115	51	8	8·0	4,280	125	30	41·1

BARLEY

Twenty varieties, including thirteen of six-row and seven two-row barley, were sown on April 30 at the rate of 2 bushels per acre, on plots one-fortieth of an acre each. The land was summer-fallowed the previous year. Only the named varieties are recorded.

BARLEY.—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Average Length of Straw including Head.	Strength of Straw on a Scale of 10 points.	Average Length of Head.	Yield of Grain Per Acre.	Yield of Grain Per Acre.		Weight per measured bushel after Cleaning.
					In.		In.	Lb.	Bush.	lb.	Lb.
1	Gold (2 row)	April 30	Aug. 20	112	33	10	2·7	4,520	94	8	53·4
2	Manchurian (6 row)	" 30	" 10	102	43	8	2·7	4,300	89	28	47·8
3	O. A. C. 21 (6 row)	" 30	" 19	111	45	8	2·7	4,280	89	8	51·0
4	Mansfield (6 row)	" 30	" 9	101	44	10	2·5	4,200	87	24	51·2
5	Oderbruch (6 row)	" 30	" 10	102	40	8	2·2	4,000	83	16	53·1
6	Stella (6 row)	" 30	" 10	102	42	8	2·7	4,000	83	16	48·7
7	Danish Chevalier (2 row)	" 30	" 16	108	37	3	3·5	3,640	75	40	51·4
8	Early Chevalier (2 row)	" 30	" 12	104	44	10	3·2	3,400	70	40	53·0
9	Canadian Thorpe (2 row)	" 30	" 16	108	45	8	2·7	3,320	69	8	51·3
10	Swedish Chevalier (2 row)	" 30	" 24	116	38	8	3·7	3·120	65	[illegible]	51·3
11	Standwell (2 row)	" 30	" 23	116	41	9	2·7	3,000	62	24	51·0
12	Invincible (2 row)	" 30	" 25	117	41	7	3·2	2,840	59	8	50·1
13	Success (6 row)	" 30	" 2	94	42	10	2·5	2,120	44	8	46·7

FALL RYE.

Two plots were sown August 29, 1914, and harvested August 3 to 6, 1915.

FALL RYE.—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Average Length of Straw including Head.	Strength of Straw on a Scale of 10 points.	Average Length of Head.	Yield of Grain Per Acre.	Yield of Grain Per Acre.	Weight per measured bushel after Cleaning.
		1914.	1915.		In.		In.	Lb.	Bush. lb.	Lb.
1	Fall Rye (Sask).	Aug. 29	Aug. 6	342	50	7	3·2	2,660	47 48	59·0
2	North Dakota No. 959	" 29	" 3	339	50	8	3·5	2,400	42 48	59·0

FIELD PEAS.

Eight varieties were sown on April 15 on summer-fallowed land, in plots of one-fortieth of an acre each.

PEAS.—Test of Varieties.

Number.	Name of Variety.	Size of Pea.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Average length of Straw.	Average length of Pod.	Yield of Grain per Acre.	Yield of Grain Per Acre.	Weight per measured bushel after Cleaning.
						In.	In.	Lb.	Bu. lb.	Lb.
1	Solo.	Large	April 15	Aug. 31	138	48	2·5	3,280	54 40	62·4
2	Prince.	Large	" 15	Sept. 5	143	52	2·5	3,200	53 20	63·6
3	Prussian Blue	Medium	" 15	" 4	142	43	2·2	3,040	50 40	63·3
4	MacKay	Large	" 15	" 5	143	45	2·5	3,000	50 ..	63·7
5	Golden Vine	Small	" 15	Aug. 30	137	46	2·5	2,920	48 40	65·0
6	English Grey	Large	" 15	Sept. 4	142	48	2·0	2,800	46 40	62·0
7	Arthur	Medium	" 15	" 3	141	50	2·5	2,760	46 ..	63·8
8	Chancellor	Small	" 15	Aug. 31	138	49	2·2	2,760	46 ..	64·2

FLAX.

Three varieties were sown on May 28 on fallow land, in plots of one-fortieth acre each.

FLAX.—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Average Length of Plants.	Yield of Seed per Acre.	Yield of Seed per Acre.		Weight per measured bushel after Cleaning.
					In.	Lb.	Bush.	Lb.	Lb.
1	Premost	May 28	Sept. 15	110	23	1,280	22	48	55·8
2	Novelty	" 28	" 20	114	24	1,160	20	40	54·2
3	Longstem	" 28	" 25	120	35	720	12	48	55·0

SHIPMENTS TO OTTAWA.

The following shipment of seed grain was made to the Dominion Cerealist, Ottawa:

	Lb.
Wheat—	
Marquis Ottawa 15	600
Marquis	6,600
Prelude	1,440
Pioneer	720
Red Fife	1,200
Oats—	
Banner	4,760
Ligowo	2,720
Victory	1,360
Barley—	
Manchurian	6,720
O. A. C. No. 21	1,440
Arthur Peas	6,000
Fall Rye	224
	33,784

EXPERIMENTAL FARM, ROSTHERN, SASK.

WM. A. MUNRO, B.A., B.S.A., SUPERINTENDENT.

THE SEASON.

A comparison of the precipitation of the season of 1915 with that of the four previous seasons might explain some of the discrepancies in yield.

PRECIPITATION, in inches.

Month.	1911	1912	1913	1914	1915
March	1·50	0·60	0·36	0·55	0·00
April	0·86	0·67	0·26	0·63	0·30
May	2·38	2·15	1·26	1·96	1·15
June	3·55	2·81	1·87	2·00	1·00
July	2·89	5·25	1·51	1·40	3·12
August	1·79	2·15	2·12	1·12	0·23
Total	12·97	13·63	7·37	7·66	5·85

This table does not show the full effect of the low total precipitation because of the way it was distributed. There were only two showers that wet the ground to a depth of 2 inches, and in most cases the showers were so distributed as to be dried off in a few hours. Added to the low precipitation is the damage done by frost on June 7, 14, and 16, a temperature of 24·2 degrees being reached on the last date. This froze all cereals to the ground.

SPRING WHEAT.

Following are the yields per acre for 1915 of the principal varieties of wheat, together with the yields for each of the previous four years and the number of days maturing in 1915. These grains were sown on April 21 on summer-fallow, and the yields are computed from the weight of grain on one-fortieth of an acre:—

Variety.	1911	1912	1913	1914	1915	1915
	Bush. lb.	Bush. lb.	Bush. lb.	Bush. lb.	Bush. lb.	Days maturing.
Huron	73 20	49 40	45 20	45 40	45 20	124
Red Fife	60 ..	27 20	36 ..	43 10	45 10	125
Marquis	70 ..	43 20	54 ..	45 20	43 30	122
Bobs	62 ..	36	57 20	51 20	41 30	123
Pioneer	.....	28 40	36 .	42 .	32 20	122
Prelude	.....	29 20	24 .	31 20	22 40	112
Kubanka	.....	.. .	16 40	44 40	43 ..	126

The average yield of Marquis wheat on 8 acres of fallow in 1915 was 34 bushels, 11 pounds, and on 6 acres of fall ploughed wheat stubble was 17 bushels 19 pounds. Two acres of Marquis wheat on fall-ploughed corn ground that had been fallowed and manured preceding the corn yielded at the rate of 39 bushels 52 pounds.

EMMER.

One plot of emmer was tried in 1915 for the first time and yielded at the rate of 2,680 pounds per acre, which at sixty pounds per bushel is 44 bushels and 40 pounds. But it must be remembered that a considerable percentage of this weight is made up of chaff, and that therefore the yield is below that of a standard variety of wheat.

OATS.

Following are the yields of the leading varieties of oats for the past five years. O.A.C. 72 is a variety recently brought out by Professor Zavitz of the Ontario Agricultural College and, during the past two years, has proved a high yielder at this Station. It is late in maturing.

Variety.	1911		1912		1913		1914		1915		1915
	Bush.	lb.	Bush.	lb.	Bush.	lb.	Bush.	lb.	Bush.	lb.	Days maturing.
Victory	109	14	83	18	143	18	82	32	113	28	121
O.A.C. 72	.....		.....		.....		97	22	107	22	121
Banner	131	26	70	20	145	30	73	18	105	20	121
Twentieth Century	128	8	68	8	132	32	74	24	102	32	121
Ligowo	121	6	69	14	108	8	80	3	102	12	120
Eighty Day	.....	.....	63	18	102	12	75	20	88	18	112
Abundance	125	30	94	4	132	32	77	22	87	22	121
Daubeney	101	6	68	8	98	28	68	28	77	2	112

The average yield of Banner oats on 6 acres of fall-ploughed stubble land was 35 bushels 8 pounds.

BARLEY.

Nineteen varieties of barley were under test this year, including four new promising varieties introduced by Dr. Chas. Saunders. Following are the results of the highest yielders, together with a record of their yields during the past four years.

Variety.	1911		1912		1913		1914		1915		1915
Six-row Varieties.	Bush.	lb.	Bush.	lb.	Bush.	lb.	Bush.	lb.	Bush.	lb.	Days maturing.
O.A.C. 21	94	8	57	4	73	16	75	..	67	24	111
Manchurian	96	32	55	40	.....		67	24	74	28	111
Black Japan	93	16	70	40	58	16	67	24	74	28	116
Taganrog	81	32	59	8	53	16	67	4	57	24	109
Odessa	100	40	44	8	46	32	67	4	62	24	111
Stella	83	16	49	8	50	40	66	12	82	44	111
Success	.....		49	8	31	32	32	36	43	36	107
Early Indian	.....		.....		11	32	45	40	32	20	111
Two-row Varieties.											
Swan's Neck	78	16	66	32	74	8	77	4	70	..	112
Duckbill	80	16	61	32	67	24	66	42	53	16	118
Early Chevalier	79	8	54	28	65		54	28	56	12	109
Swedish Chevalier	71	32	55	40	56	22	53	16	72	44	118
Beaver	70	40	38	15	46	32	45	20	40	40	112

In 1911, O.A.C. 21 came second to Manchurian in point of yield, and in 1912 it was second to Black Japan, while in 1913 it was second to Swan's Neck. Even though eighth this year it is still the highest in all the barleys for the average of five years.

Two acres of O.A.C. 21 barley on root ground yielded 43 bushels 11 pounds per acre.

PEAS.

It is difficult to determine the comparative merits of peas in small plots because of the tendency to shell in the process of harvesting. Notwithstanding the discrepancy of comparative yields during the past five years, the Arthur pea is the one recommended above the others, not only because it is nearly as high a yielder as the others, but it is earlier and is the only one that has not been caught by the frost before ripening in a season of early frosts.

EXPERIMENTAL STATION, SCOTT, SASK.

MILTON J. TINLINE, B.S.A., ACTING SUPERINTENDENT.

WEATHER.

The season of 1915 was particularly suitable for testing cereal crops and also for the production of heavy yields. All conditions were favourable, the rains during the preceding autumn had penetrated to a considerable depth, and the frost during the winter had followed the moisture down. The gradual thawing out of the moist soil during the early summer, together with the copious June rains, provided an abundant supply of moisture for plant growth.

Seeding was general by April 13, which was one day earlier than the average. Favourable spring weather, together with the increased area prepared for crop the preceding autumn, facilitated seeding operations, so that a larger acreage than usual was sown in seasonable time.

The weather during May, June, and July was cooler than usual. In some sections frosts as late as June 16 froze the crop almost to the ground, but, owing to the abundant supply of moisture, the crops rapidly recovered from this set-back, and made an extremely quick growth. Commencing on August 3, warm, dry weather was experienced, which caused the crops to ripen in good season.

Satisfactory weather conditions permitted rapid progress with harvesting and threshing, with the result that the most profitable cereal crop ever harvested in northwestern Saskatchewan was saved in first-class condition.

TEST OF VARIETIES.

The cereal tests conducted during the past season included five named varieties of wheat, five hybrid wheats received from the Dominion Cerealist, nine varieties of oats, seven of barley, five of field peas, three of flax, and one of spring rye.

In order to check up possible experimental errors, all tests were made in duplicate.

The field on which the tests were carried out, was summer-fallowed in 1914. The soil was a dark chocolate clay loam. All plots were one-fortieth of an acre in area.

SPRING WHEAT.

Five named varieties of spring wheat were sown on April 13. Seed was used at the rate of 1¾ bushels per acre.

The Red Fife lodged badly in both tests, while the Marquis stood up well on adjoining plots.

It will be noted that the Prelude yielded almost equally well with the Pioneer and ripened earlier. The latter variety was attacked by rust earlier in the season, which decreased the yield and affected the quality of the grain.

SPRING WHEAT.—Test of Varieties.

Number.	Name of variety.	Date of sowing.	Date of ripening.	No. of days maturing.	Average length of straw including head.	Strength of straw on a scale of 10 points.	Average length of head.	Yield of grain per acre.	Yield of grain per acre.	Weight per measured bushel after cleaning
					Inches		Inches	Lb.	Bu. lb.	Lb.
1	Marquis	April 13	Aug. 21	130	51·0	8	3·1	3,100	51 40	64·5
2	Huron	" 13	" 21	130	51·0	9	3·1	3,010	50 10	62·4
3	Red Fife	" 13	" 27	136	57·0	6	3·5	2,790	46 30	62·8
4	Pioneer	" 13	" 17	126	49·0	6	2·7	2,250	37 30	63·0
5	Prelude	" 13	" 12	121	43·0	9	2·0	2,110	35 10	65·0

OATS.

Nine varieties of oats were sown on April 27. The seed was used at the rate of 2½ bushels per acre.

The Victory has, for the third time on this Station, headed the list in yield of grain per acre. The Twentieth Century and Ligowo are almost equal in the four-year averages. The former is rather coarse in the straw and has a fairly high percentage of hull. The Ligowo has been recommended by the Dominion Cerealist, for northwestern Saskatchewan; it is usually a little earlier maturing than most of the very heavy yielding sorts. The kernel is short and plump, and this season this variety weighed 3½ pounds more per measured bushel than any of the others under test. The straw of the Ligowo is fine, but not so strong as the straw of the Banner. The Abundance variety was dropped from the tests as past experiments have proved this oat to be inferior in point of yield.

In the seed plots, where Ligowo, Victory, and Banner were grown under field conditions, a special strain of the Ligowo was used, with the result that Ligowo gave the heaviest yield, with Victory second, and Banner third.

OATS.—Test of Varieties.

Number.	Name of variety.	Date of sowing.	Date of ripening.	No. of days maturing.	Average length of straw including head.	Strength of straw on a scale of 10 points.	Average length of head.	Yield of grain per acre.	Yield of grain per acre.	Weight per measured bushel after cleaning
					Inches		Inches	Lb.	Bu. lb.	Lb.
1	Victory	April 27	Aug. 21	116	63·5	8	8·0	4,250	125 ..	40·8
2	Twentieth Century	" 27	" 24	116	62·5	8	8·0	4,230	124 14	39·8
3	Gold Rain	" 27	" 21	116	65·2	8	7·7	4,110	120 30	40·6
4	Banner	" 27	" 23	118	64·7	9	9·2	4,070	119 24	39·0
5	Ligowo	" 27	" 21	116	63·2	7	7·7	4,010	117 2	42·4
6	Eighty Day	" 27	" 12	107	54·5	4	6·5	3,920	115 10	37·0
7	Great French Lizo	" 27	" 21	116	62·7	6	7·2	3,860	113 18	40·0
8	Tartar King	" 27	" 23	118	61·3	7	8·8	3,860	113 18	40·6
9	Daubeney	" 27	" 12	107	55	6	7	3,800	111 26	35·5

SCOTT.

BARLEY.

Barley, owing to the light yields so frequently secured, has not proved to be a popular crop in this district. The inferior yields are due, in part, to the practice of using barley as a cleaning crop and, in part, to the land being new and soddy.

Four varieties of six-row, and three of two-row were sown on April 27 and 28. The seed was used at the rate of 2 bushels per acre.

The Black Japan, while heavy yielding on summer-fallow, has not been tested out on spring or fall ploughing. The O.A.C. No. 21 is first in an average for four years, and, with the variety Manchurian, is usually recommended for the west. Success is a beardless variety, but is inferior in point of yield.

Of the two-row type, Duckbill is one of the most satisfactory, giving a heavy yield and weighing well per measured bushel. The Early Chevalier lodged comparatively early in the season, consequently some difficulty was experienced in harvesting.

BARLEY.—Test of Varieties.

Number.	Name of variety.	Date of sowing.	Date of ripening.	No. of days maturing.	Average length of straw including head.	Strength of straw on a scale of 10 points.	Average length of head.	Yield of grain per acre.	Yield of grain per acre.	Weight per measured bushel after cleaning
					Inches.		Inches.	Lb.	Bu. lb.	Lb.
1	Black Japan, 6-row...	April 28	Aug. 16	110	45	9	2·5	3,545	73 41	50·0
2	Duckbill, 2-row.....	" 28	" 16	110	56	9	3·2	3,320	69 8	52·9
3	O.A.C. No. 21, 6-row.	" 27	" 16	111	57	6	3·0	3,130	65 10	50·8
4	Manchurian, 6-row....	" 27	" 16	111	57	6	3·0	2,970	61 42	49·5
5	Early Chevalier, 2-row.....	" 28	16	110	52	5	3·0	2,890	60 10	52·1
6	Brewer, 2-row.....	" 28	" 16	110	50	6	3·1	2,770	57 34	50·0
7	Success, 6-row.....	" 27	" 7	102	48	9	3·0	2,510	31 22	48·2

FIELD PEAS.

Five varieties of peas were sown on April 28. Amounts of seed used varied from 2¾ to 3½ bushels per acre, depending on the size of the individual peas.

The Arthur variety headed the list this year, and is first in an average of four years. This variety is an early maturing, medium-sized, white pea.

PEAS.—Test of Varieties.

Number.	Name of variety.	Size of pea.	Date of sowing.	Date of ripening.	Number of days maturing.	Average length of plants.	Average length of pod.	Yield of seed per acre.	Yield of seed per acre.	Weight per measured bushel after cleaning.
						Inches.	Inches.	Lb.	Bu. lb.	Lb.
1	Arthur.....	Medium	April 28	Sept. 10	135	36	2·0	3,290	54 50	65·3
2	Prussian Blue.....	"	" 28	" 14	139	62	2·5	2,890	48 10	65·7
3	English Grey.....	"	" 28	" 14	139	56·5	2·2	2,880	48 ..	64·2
4	Chancellor.....	Small	" 28	" 10	135	51	2·0	2,830	47 10	66·0
5	Golden Vine.....	"	" 28	" 12	137	46	1·7	2,710	45 10	66·0

SPRING RYE.

Spring rye (Ottawa Select) was sown on April 13. The crop was headed out by June 16, and was ripe August 17. The average height of the plants, including head, was approximately 5 feet. The yield per acre of threshed grain was 3,220 pounds or 57 bushels and 28 pounds. The strength of the straw was 5, on a scale of 10 points; the average length of the heads was 3·2 inches, and the weight per bushel of the threshed grain was 59·5 pounds.

FALL RYE.

The seed of three varieties of fall rye was secured in the late summer, from the Experimental Station at Sidney, B.C. Duplicate plots, of each, were sown on September 7, on land that had been fallowed during the summer. Notwithstanding the dry autumn, the rye made satisfactory growth, and went into the winter in fairly good condition.

FLAX.

Three varieties of flax were sown on April 29. The seed was used at the rate of 30 pounds per acre.

The two named varieties, Novelty and Longstem, were secured from the Dominion Cerealist. The former is a selection from the Novarossiek variety, and was grown at Ottawa for some time under the name of Novarossick B. The Longstem, true to its name, is very tall and is a selection from the Common flax.

FLAX.—Test of Varieties.

Number	Name of variety.	Date of sowing.	Date of ripening.	Number of days maturing.	Average length of plants.	Yield of seed per acre.	Yield of seed per acre.	Weight per measured bushel after cleaning
					Inches	Lb.	Bu. lb.	Lb.
1	Common	April 29	Sept. 6	130	26	1,470	26 14	53
2	Novelty	" 29	" 5	129	23	1,450	25 50	53
3	Longstem	" 29	" 7	131	34	1,050	18 42	53

SEED GRAIN.

The following table gives the yield per acre, and number of days required to mature crops grown under comparable conditions for seed purposes:—

Variety.	Number of acres.	Number of days maturing.	Yield of grain per acre.	Yield of grain per acre.
Wheat.			Lb.	Bush. lb.
Marquis	10	123	2,197	36 37
Oats.				
Ligowo	5	116	3,111	91 17
Victory	5	117	2,915	85 25
Banner	5	122	2,787	81 33
Barley.				
O. A. C. No. 21	6	101	2,116	44 11
Manchurian	5	103	1,961	40 6

SEED GRAIN SUPPLIED FROM THE SCOTT STATION.

While all the grain grown on the Station during the past year was of excellent quality and free from weed seeds, yet only grain that had been sown on new land and had been carefully rogued in the fields was saved for seed purposes.

The following list includes grain sold to farmers, and amounts supplied the Illustration Stations:—

Variety.	Number of bushels.	Number of farmers supplied.
Wheat.	Bush.	
Marquis	90	13
Oats.		
Banner	133	14
Ligowo	35	7
Victory	25	3
Barley.		
Manchurian	6	2
Peas.		
Arthur	90	10
Total	379	49

EXPERIMENTAL STATION, LETHBRIDGE, ALTA.

W. H. FAIRFIELD, M.S., SUPERINTENDENT.

SEASONAL NOTES.

The season of 1915 opened at about the usual time for the district, and from the beginning was most favourable for all kinds of cereals. The soil was in prime condition for seeding in the spring on account of the large amount of moisture carried over from the fall before. Winter wheat, although not grown to such an extent as formerly, came through the winter well and started a strong, vigorous growth which it maintained as is evidenced by the yields reported in the tables following. Seeding operations were not interrupted to any extent by storms during the month of April and were concluded throughout this part of the province in good season. The rains during May, June, and July, although not excessive, came just when needed. There was no period during the whole growing season when grain suffered in any way at all for moisture and the result was that most phenomenal yields were obtained with all the cereals. The first frost in the fall was on September 11 and on the 12th a killing frost occurred, but by this date all kinds of grain crops were well matured.

NO IRRIGATION USED.

On account of the very favourable season none of the grain was irrigated, so, although the varieties were sown on both irrigated and non-irrigated land, the report will not be divided into two parts as has been the custom in the past. On the irrigated land the grain was all lodged badly, which reduced the yields materially in nearly all cases.

EXPERIMENTS WITH WINTER WHEAT.

Ten varieties of winter wheat were sown on summer-fallowed land September 1, 1914. They came through the winter well and gave high yields. The area of each plot was one-sixtieth of an acre.

WINTER WHEAT (Non-irrigated).—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	Number of days maturing.	Average length of straw, including head.	Strength of straw on a scale of 10 points.	Weight of straw.	Average length of head.	Yield of grain per acre.	Yield of grain per acre.	Weight per measured bushel after cleaning	Average yield for 3 years.	
				Inches.		Lb.	In.	Lb.	Bu.	lb.	Lb.	bu. lb.
1	Dawson's Golden Chaff	Aug. 2	336	47·5	10	6,720	3·2	4260	71	..	62·5	37 40
2	Minnesota No. 529	" 9	343	52·5	10	6,900	4·2	4140	69	..	64	36 25
3	Kharkov	" 6	340	46·5	6	6,525	3·5	4035	67	15	65	33 45
4	Minnesota No. 561	" 6	340	45·5	4	6,315	3·0	3825	63	45	64	39 ..
5	Buffum No. 17	" 6	340	55·5	9	6,930	3·7	3810	63	30	63	36 10
6	Azima	" 4	338	45·0	5	6,630	2·7	3750	62	30	63	35 5
7	Egyptian Amber	" 5	339	49·2	7	6,270	4·0	3690	61	30	64	31 ..
8	Kansas Red	" 4	338	42·5	5	6,300	3·2	3660	61	.	64	34 40
9	Tasmania Red	" 5	339	51·5	6	6,315	3·7	3645	60	45	64·5	29 45
10	Ghirka	" 3	337	50·0	3	8,370	3·0	3510	58	30	63	33 5

EXPERIMENTS WITH SPRING WHEAT.

Fourteen plots of spring wheat were sown on dry land and six on irrigated land. The wheat on the dry land was sown on summer-fallow on April 12. On the irrigated area the wheat was sown on the same day but on land on which roots had been grown the year previous. No irrigation was given. The area of each plot was one-sixtieth of an acre. It is of interest to note that Kubanka, a macaroni wheat, headed the list in yield. This is rather unnsual for until this year the average yield for Kubanka has not heen higher than some of the standard varieties. such as Red Fife or Marquis.

Some of the varieties under test have not yet received names. These sorts are omitted from the report.

SPRING WHEAT (Non-irrigated).—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	Number of days maturing.	Average length of straw, including head.	Strength of straw on a scale of 10 points.	Average length of head.	Yield of grain per acre.	Yield of grain per acre.		Weight per measured bushel after cleaning	Average yield for 3 years.	
				Inch.		Inches.	Lb.	Bu.	lb.	Lb.	Bu.	lb
1	Kubanka	Aug. 18	128	53	8	2·5	5,460	91	..	64·5	44	30
2	Red Fife	" 22	132	51	10	3·5	4,225	70	25	63	40	18
3	Early Red Fife	" 19	129	52	10	4·0	3,870	64	30	65·5	38	54
4	Marquis	" 16	126	48	10	3·0	3,795	63	15	65	37	33
5	Huron	" 18	128	50	10	3·5	3,780	63	..	64·5	42	45
6	Early Russian	" 24	134	50	9	3·5	3,585	59	45	65·5	37	35
7	Bobs	" 13	123	44	10	3·5	3,270	54	30	65	37	10
8	Pioneer	" 13	123	44	10	3·0	2,985	49	45	64	32	35
9	Prelude	" 6	116	42	10	2·2	2,400	40	..	64·5	20	25

SPRING WHEAT (Irrigated).—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	Number of days maturing.	Average length of straw, including head.	Strength of straw on a scale of 10 points.	Average length of head.	Yield of grain per acre.	Yield of grain per acre.		Weight per measured bushel after cleaning	Average yield for 3 years.	
				Inch.		Inches.	Lb.	Bu.	lb.	Lb.	Bu.	lb.
1	Marquis	Aug. 23	133	53	8	3·5	5,640	94	..	64	66	38
2	Huron	" 24	134	59	4	3·7	5,169	86	..	62	60	7
3	Prelude	" 7	117	42	10	2·5	3,600	60	..	65	40	28
4	Red Fife	" 27	137	51	1	3·	3,180	53	..	61	48	41
5	Pioneer	" 20	130	47	2	3·0	2,640	44	..	63·5	46	55

EXPERIMENTS WITH OATS.

Eight varieties of oats were tested on the non-irrigated land and five varieties on the irrigated land. The oats on dry land were sown April 15, and on irrigated land April 16. The area of each plot was one-sixtieth of an acre. All of the varieties of oats on the irrigated land were so badly lodged that it was impossible to harvest the crop properly and the yields reported are, therefore, not very reliable. Banner oats went down perhaps worse than any of the others which accounts for its giving the lowest yield on the irrigated land.

LETHBRIDGE.

Oats (Non-irrigated).—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	Number of days maturing.	Average length of straw, including head.	Strength of straw on a scale of 10 points.	Average length of head.	Yield of grain per acre.	Yield of grain per acre.	Weight per measured bushel after cleaning	Average yield for 4 years.
				Inch.		Inches.	Lb.	Bu. lb.	Lb.	Bu. lb.
1	Gold Rain	Aug. 15	122	57	10	8·5	5,430	159 24	40	87 26
2	Irish Victor	" 16	123	57	10	7	5,160	151 26	40	85 20
3	Banner	" 14	121	54	10	8	4,860	142 32	38	85 24
4	Victory	" 16	123	54	10	6·5	4,680	137 22	41	87 31
5	Swedish Ligowo	" 15	122	57	10	8	4,590	135 ..	39	74 8
6	Danish Island	" 17	124	53	9	7	4,560	134 4	40	85 ..
7	Lincoln	" 16	123	53	10	8·5	4,410	129 24	40	76 29
8	Daubeney	" 6	113	42	10	7	4,065	119 19	35	60 34

Oats (Irrigated).—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	Number of days maturing.	Average length of straw, including head.	Strength of straw on a scale of 10 points.	Average length of head.	Yield of grain per acre.	Yield of grain per acre.	Weight per measured bushel after cleaning	Average yield for 3 years.
				Inch.		Inches.	Lb.	Bu. lb.	Lb.	Bu. lb.
1	Irish Victor	Aug. 20	126	66	1	8·5	5,160	150 ..	37	127 32
2	Gold Rain	" 16	122	65	4	8	4,800	141 6	37	.. ..
3	Daubeney	" 7	113	57	1	8	4,500	132 12	34	101 16
4	Danish Island	" 16	122	62	1	8	3,960	116 16	36	116 16
5	Banner	" 15	121	62	1	9	2,760	81 6	39	103 7

EXPERIMENTS WITH BARLEY.

Twelve varieties were tested on both dry and irrigated land and were planted in both cases on April 16. On the dry land the varieties were sown on summer-fallow and on the irrigated land on which roots had been grown the previous season. The area of each plot was one-sixtieth of an acre. It will be noticed that the yields are higher on the dry land than on the irrigated land. This was due to the fact that the grain lodged worse on the irrigated land.

BARLEY (Non-irrigated).—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	Number of days maturing.	Average length of straw, including head.	Strength of straw on a scale of 10 points.	Average length of head	Yield of grain per acre	Yield of grain per acre.		Weight per measured bushel after cleaning	Average yield for 4 years.	
				Inch.		Inches.	Lb.	Bu.	lb.	Lb.	Bu.	lb.
1	Odessa (6 row)	Aug. 9	115	37	2	3	4,650	96	42	51	53	21
2	Mansfield (6 row)	" 9	115	47	8	2·5	4,650	96	42	51	47	46
3	O. A. C. No. 21 (6 row)	" 5	111	46	8	3	4,440	92	24	49	45	46
4	Manchurian (6 row)	" 5	111	48	9	3·5	4,155	86	27	48·5	41	38
5	Swedish Chevalier (2 row)	" 9	115	40	3	4·5	4,155	86	27	52	50	41
6	Duckbill (2 row)	" 10	116	50	10	3	4,110	85	30	54	..	..
7	Invincible (2 row)	" 13	119	45	5	3	4,005	83	21	49	50	15
8	Gold (2 row)	" 10	116	38	3	3·5	3,960	82	24	52	..	..
9	Claude (6 row)	" 6	112	39	4	2·5	3,795	79	3	49	44	22
10	Clifford (2 row)	" 5	111	51	8	4	3,360	70	.	52	39	33
11	Guymalaye (6 row)	" 2	108	33	4	2	3,330	69	18	60	37	28
12	Early Chevalier (2 row)	" 4	110	45	6	3·7	3,225	67	9	52·5	38	36

BARLEY (Irrigated).—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	Number of days maturing.	Average length of straw including head.	Average length of head.	Yield of grain per acre.	Yield of grain acre. per		Weight per measured bushel after cleaning	Average yield for 3 years.	
				Inches.	Inches.	Lb.	Bu.	lb.	Lb.	Bu.	lb.
1	Invincible (2 row)	Aug. 13	119	47	2·5	4,380	91	12	52	89	23
2	O. A. C. No. 21 (6 row)	" 10	116	51	2·5	4,320	90	..	48	82	9
3	Mansfield (6 row)	" 10	116	54	2·5	4,020	83	36	48·5	76	37
4	Gold (2 row)	" 13	119	36	3·0	3,900	81	12	51	..	..
5	Swedish Chevalier (2 row)	" 13	119	46	3·5	3,870	80	30	51	88	6
6	Early Chevalier (2 row)	" 10	116	47	3·0	3,840	80	..	51	67	32
7	Claude (6 row)	" 10	116	50	2·5	3,840	80	..	48	90	20
8	Odessa (6 row)	" 10	116	48	3·0	3,600	75	..	46	77	30
9	Duckbill (2 row)	" 13	119	54	2·5	3,540	73	36	51	..	..
10	Manchurian (6 row)	" 8	114	52	3·0	3,480	72	24	47	69	41
11	Clifford (2 row)	" 7	113	57	2·5	3,240	67	24	49	62	4
12	Guymalaye (6 row)	" 3	109	37	2·5	3,210	66	42	57·5	70	..

LETHBRIDGE.

EXPERIMENTS WITH PEAS.

Nine varieties were tested on both dry and irrigated land. The area of each plot was one-sixtieth of an acre. It will be noted that the yields are particularly satisfactory. Peas are a crop that should be more extensively raised in Alberta than they are. The seed was sown at the rate of 2 bushels to the acre in the case of the small peas and 2½ bushels to the acre in the case of medium to large sized peas. The yields given are of course higher than could be expected in a normal year but after the peas have been grown on land for one season, or if the seed or soil is inoculated, the yields are usually quite satisfactory. The most serious objection to the raising of this crop is the difficulty in harvesting, for on account of our high winds the crop is apt to blow about badly after being cut before being threshed or stacked.

PEAS (Non-irrigated).—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Average Length of Straw.	Average Length of Pod.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per Measured bushel after Cleaning.	Average yield for 5 years
					In.	In.	Lb.	Bu. lb.	Lb.	Bu. lb.
1	Mackay	April 12	Aug. 27	137	74	2·7	4,470	74 30	62·5	39–30
2	Prussian Blue	" 12	" 25	135	71	2·7	4,410	73 30	65·0	38–18
3	Solo	" 12	" 21	131	62	2·2	4,140	69 ..	62·0	.....
4	English Grey	" 12	" 23	133	72	2·2	4,020	67 ..	65·0	36–18
5	Chancellor	" 12	" 22	132	63	2·2	3,480	58 ..	64·0	32–42
6	Picton	" 12	" 23	133	63	2·2	2,340	39 ..	66·0	29–36
7	Prince	" 12	" 25	135	70	2·5	1,995	33 15	64·0	30–27
8	Golden Vine	" 12	" 21	131	71	2·2	1,995	33 15	65·0	27–45
9	Arthur Selected	" 12	" 20	130	46	2·5	1,740	29 ..	66·0	27–36

PEAS.—(Irrigated).—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Average Length of Straw.	Average Length of Pod.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per measured bushel after Cleaning.	Average yield per acre for 5 years.
					In.	In.	Lb.	Bu. lb.	Lb.	Lb.
1	Prince	April 12	Aug. 28	138	75	1·7	4,560	76 ..	65·5	60–12
2	Picton	" 12	" 27	137	70	2·5	4,095	68 15	66·0	52–42
3	Golden Vine	" 12	" 27	137	65	2·2	3,405	56 45	67·0	48–39
4	Arthur Selected	" 12	" 21	131	66	2·5	3,285	54 45	66·0	44–51
5	English Grey	" 12	" 25	135	86	2·7	2,475	41 15	65·0	48–9
6	MacKay	" 12	" 26	136	76	2·0	2,400	40 ..	67·0	50–16
7	Prussian Blue	" 12	" 27	137	78	1·7	2,355	39 15	65·0	47–15
8	Solo	" 12	" 22	132	108	2·0	2,265	37 45	66·5	.....
9	Chancellor	" 12	" 22	132	90	2·0	1,980	33 ..	65·0	41–48

LETHBRIDGE.

EXPERIMENTS WITH FLAX.

Five varieties of flax were sown on summer-fallow on non-irrigated land. The area of each plot was one-sixtieth of an acre.

FLAX (Non-irrigated).—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Average Length of Plants.	Yield of Seed per Acre.	Yield of Seed per Acre.	Weight per measured bushel after Cleaning.
					In.	Lb.	Bush. Lb	Lb.
1	Common	May 21	Sept. 3	105	30	1,740	31 4	54·5
2	S.J. 30 Mocassin (Montana)	" 21	" 3	105	30	1,380	24 36	56·0
3	Longstem	" 3	" 4	124	37	1,200	21 24	54·0
4	Golden	April 15	" 1	139	34	1,140	20 20	55·5
5	Novelty	May 3	" 2	122	32	990	17 38	54·0

EXPERIMENTS WITH RYE.

A plot of winter rye sown September 1, 1914, and spring rye on April 15, 1915. The yields, as will be noted, are particularly high. In this connection it might not be out of place to say that our usual results with spring rye, so far as yield is concerned, have not been particularly satisfactory. Spring rye is often planted by newcomers for green feed, it being selected because it can be sown late. Our experience has been that oats will produce even more green feed than will the spring rye. On the other hand winter rye does particularly well for green feed. When sown on summer-fallow about the first of September it comes on early and produces considerable crop in very dry seasons.

RYE (Non-irrigated).—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Average Length of Plants.	Yield of Seed per Acre	Yield of Seed per Acre.	Weight per measured bushel after Cleaning.
				In.	Lb.	Bush. Lb.	Lb.
1	Winter Rye	Sept. 1 '14	Aug. 2	65	3,630	64 46	56·0
2	Spring Rye	Apl. 15 '15	" 16	56	3,000	53 32	51·6

LETHBRIDGE.

EXPERIMENTAL STATION FOR CENTRAL ALBERTA.

G. H. HUTTON, B.S.A., SUPERINTENDENT.

THE SEASON.

The season of 1915 was a favourable one for the production of large yields of grain. No frosts being registered until September 13, ample time was allowed for each variety of grain to ripen and give the best possible account of itself. The peculiarly favourable season may show some varieties of grain to be very heavy yielders which would not be suited to the average season in central Alberta. The seeding of the variety test plots was commenced April 10, the weather being warm and bright and the soil in a fine state of tilth. The rainy season commenced in May and lasted throughout June. The precipitation for the five months, April to September, was 14·26 inches. This abundant rainfall followed by warm, dry weather in July and August caused a luxuriant growth that came to full maturity, with the exception of a few plots which lodged. The latest cereal plots were harvested on August 31, with the exception of several plots of peas which were cut September 10. The grain from all plots was threshed by September 30, and stored in good condition.

SPRING WHEAT.

Fifteen varieties of spring wheat were sown in uniform test plots one-fortieth acre in size, on April 10. The land had previously grown roots and was thoroughly disced and harrowed in preparation for the seed which was sown at the rate of from 2¾ to 3¾ bushels per acre. Heavy seeding has been found profitable on heavy black loam soil, since ripening is hastened and the proportion of straw reduced. Only the named varieties are mentioned in the table.

WHEAT.—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of straw including head.	Strength of straw on a scale of 10 points	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per measured bushel after cleaning.
					In.		In.	Lb.	Bu. Lb.	Lb.
1	Bobs	April 10	Aug. 28	140	52·5	10	4·5	4,693	78 13	62·2
2	Bishop	" 10	" 28	140	58·5	6	3·2	4,220	70 20	64·0
3	Huron	" 10	" 28	140	56·0	10	4·2	4,220	70 20	63·0
4	Early Russian	" 10	" 28	140	61·0	4	4·2	4,080	68	62·9
5	Marquis	" 10	" 30	142	52·0	10	3·7	3,535	58 55	62·0
6	Red Fife	" 10	" 30	142	57·0	9	4·0	3,530	58 50	63·0
7	Pioneer	" 10	" 25	137	47·5	9	4·2	2,840	47 20	63·2
8	Prelude	" 10	" 14	126	48·5	10	2·5	2,680	44 40	64·0

SPRING WHEAT.—Test of Varieties.—Four-year Average.

Variety.	No. of days maturing.	Yield per acre.	
		Bush.	Lb.
Bishop	144	59	30
Huron	144	57	22
Bobs	143	57	21
Red Fife	143	55	45
Early Russian	144	55	45
Marquis	141	49	44
Pioneer, (3 years)	142	41	13
Prelude	130	39	10

Marquis, although not occupying a prominent place in the list of spring wheats when they are arranged in the order of their yields, has qualities that make it superior to the other varieties of wheat. Maturing earlier than Red Fife, it is equal to it in milling value, and grows in the field with a perfect strength of straw. The grain is clean, plump, and weighs well per measured bushel, and is not at all liable to rust or smut. Marquis can therefore be recommended for all districts where the season is sufficiently long to allow it to mature. Where an earlier wheat is desired, Prelude should be grown as it ripens about fourteen days earlier than Marquis, and has good milling value. Prelude is a bearded wheat and yields from ten to fifteen bushels less grain per acre than Marquis.

SPRING WHEAT.—Field lots suitable for seed.

Variety.	Area.	Total yield.		Yield per acre.	
	Acres.	Bush.	lb.	Bush.	lb.
Marquis	6·98	395	45	56	10
Prelude	4·3	110	..	25	35

FALL WHEAT.

Field six on rotation "L" was broken from sod in July and seeded to Kharkoff winter wheat on August 12, 1914. A splendid crop of wheat was cut August 27, 1915, that yielded 36·7 bushels of grain per acre.

SPRING RYE.

One plot of spring rye was sown on April 10, at the rate of 3 bushels per acre, on land that had previously grown roots. This plot was cut August 31, and yielded at the rate of 58 bushels and 20 pounds to the acre.

LACOMBE.

EXPERIMENTS WITH OATS.

Seventeen varieties of oats were planted April 12, on black loam soil that was in roots the year before. Seed was used at the rate of 3½ to 4 bushels per acre. None of the numbered varieties of oats yielded above those reported on in the following table:—

OATS—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days maturing.	Average length of straw, including head.	Strength of straw on a scale of 10 points.	Average length of head.	Yield of grain per acre.	Yield of grain per acre.	Weight per measured bushel after cleaning
					In.		In.	lb.	Bu. lb.	Lb.
1	Swedish Select	April 12	Aug. 22	132	61	10	8·2	4,900	144 4	43·1
2	Victory	" 12	" 23	133	60	10	8·2	4,880	143 18	44·2
3	Irish Victor	" 12	" 22	132	64	10	9·2	4,420	130	42·0
4	Banner	" 12	" 26	136	61	10	10·7	4,253	125 3	43·1
5	O. A. C. 72	May 5	" 30	117	68	10	9·0	4,180	122 32	40·8
6	Ligowo	April 12	" 23	133	64	9·5	10·5	4,040	118 28	41·8
7	Tartar King	" 12	" 23	133	60	10	11·7	3,980	117 2	40·3
8	Little Gem	" 12	" 15	125	59	10	5·7	3,910	115 ..	37·8
9	Danish Island	" 12	" 24	134	61	10	10·0	3,860	113 18	42·3
10	Great French Lizo	" 19	" 23	126	64	9	9·0	3,790	111 16	42·3
11	Gold Rain	" 12	" 23	133	67	10	9·0	3,770	110 30	44·2
12	Daubeney	" 12	" 19	129	56	9·5	9·7	3,640	107 2	29·1
13	Eighty Day	" 12	" 15	125	52	10	6·2	3,510	103 8	38·0

OATS.—Test of Varieties.—Five-year averages.

Variety.	No. of days maturing.	Yield per acre.	
		Bu.	lb.
Victory	139	110	22
Irish Victor	137	108	18
Banner	138	105	15
Abundance	139	97	30
Daubeney (4 yr.)	129	97	2
Tartar King	136	94	1
Danish Island	136	93	6
Swedish Select	135	93	
Gold Rain (3 yr.)	135	84	27
Ligowo (4 yr.)	137	82	30
Eighty Day (4 yr.)	124	71	4

CROSS SOWING.

A new drill with runs 3 inches apart is being placed on the market and the claim made that greater yields of grain can be secured from an acre when sown with the same quantity of seed from this drill than from the common drill with runs 6 or 7 inches apart. A test was made this year of cross sowing which should amount to about the same thing as using one of the new drills. A plot was sown first lengthwise and then crosswise with a drill having runs 7 inches apart, using the same amount of seed on this plot as on one that was seeded singly. No advantage was gained by cross sowing last season, but it is purposed to make a further test of this before definite results are published.

LACOMBE.

BARLEY.

Ten varieties of six-row and five of two-row barley were tested in 1915. The seed was sown at the rate of 3 bushels per acre on black loam land that had grown roots in 1914. Seed was sown April 13, and cutting of the plots was done from August 10 to August 21. Only the named sorts are here reported upon. One of the new varieties, not yet named, yielded at the rate of over 63 bushels per acre.

Six-row Barley.—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days maturing.	Average length of straw, including head.	Strength of straw on a scale of 10 points.	Average length of head.	Yield of grain per acre.	Yield of grain per acre.		Weight per measured bushel after cleaning
					In.		In.	Lb.	Bu.	lb.	Lb.
1	Odessa	April 13	Aug. 16	125	41	10	2·0	2,400	50	..	51·6
2	Mansfield	" 13	" 16	125	43	10	2·0	2,325	48	21	54·2
3	O. A. C. 21	" 13	" 16	125	53	10	2·5	2,180	45	20	48·1
4	Stella	" 13	" 18	127	52·5	10	3·2	2,000	41	32	51·4
5	Manchurian	" 13	" 16	125	51	10	2·7	1,980	41	12	49·1
6	Success	" 13	" 10	119	40	10	2·2	1,560	32	24	50·3
7	Guymalaye	" 13	" 10	119	37	10	2·2	1,520	31	32	62·0

Two-row Barley.—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days maturing.	Average length of straw, including head.	Strength of straw on a scale of 10 points.	Average length of head.	Yield of grain per acre.	Yield of grain per acre.		Weight per measured bushel after cleaning
					In.		In.	Lb.	Bu.	lb.	Lb.
1	Gold	April 14	Aug. 23	131	41	10	2·2	2,550	53	6	55·4
2	Swedish Chevalier	" 14	" 26	134	44·5	10	3·0	2,220	46	12	55·2
3	Invincible	" 14	" 26	134	45	10	2·7	1,524	31	36	54·8
4	Early Chevalier	" 14	" 16	124	41	10	2·2	550	11	22	53·2
5	Swan's Neck	" 14	" 17	125	42·5	10	2·2	440	9	8	54·4

Six-row Barley.—Test of Varieties.—Four-year average.

Variety.	No. of days maturing.	Yield per acre.	
		Bu.	lb.
Mansfield	124	70	25
O. A. C. 21	125	66	10
Odessa	126	65	46
Manchurian	128	64	22
Stella	126	60	..
Guymalaye	122	42	34
Success	118	26	22

TWO-ROW BARLEY.—Test of Varieties.—Four-year Average.

Variety.	No. of days maturing.	Yield per acre.	
		Bu.	lb.
Swedish Chevalier	132	65	37
Gold (2 yr.)	133	62	9
Invincible	130	58	17
Swan's Neck	126	49	18
Early Chevalier	121	41	7

PEAS.

Six varieties of peas were sown April 12, on black loam soil. These made fairly good growth and were harvested September 10, with the exception of the Arthur and Solo varieties which had been cut August 31.

PEAS.—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days maturing.	Average length of straw.	Average length of Pod.	Yield of grain per acre.	Yield of grain per acre.	Weight per measured bushel after cleaning
					Inches.	Inches.	Lb.	Bu. lb.	Lb.
1	Prussian Blue	April 12	Sept. 10	151	70	2½	2,560	42 40	64·0
2	Golden Vine	" 12	Sept. 8	149	80	2¼	2,380	39 40	64·4
3	Chancellor	" 12	Sept. 8	149	76	2¼	2,340	39 ..	64·5
4	English Grey	" 12	Sept. 8	149	66	2¼	2,300	38 20	62·0
5	Arthur Selected (average of 3 plots)	" 12	Aug. 29	139	65	2½	2,197	36 37	64·6
6	Solo	" 12	" 29	139	70	2½	2,080	34 40	64·0

FLAX.

Flax, although not a common crop in this section of Alberta, was tested last year and gave very satisfactory returns. The seed was put in May 11, and harvested September 10. The land was a heavy black loam that had grown roots in 1914. Two smaller plots of Longstem and Novelty flax were tested for a fibre crop, and a sample from each sent to Ottawa to be retted.

FLAX.—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days maturing.	Average length of Plants.	Yield of Seed per acre.	Yield of Seed per acre.	Weight per measured bushel after cleaning.
					Inches.	Lb.	Bu. lb.	Lb.
1	Novelty	May 11	Sept. 10	122	32	1,580	28 12	51·5
2	Longstem	" 11	" 7	119	43	1,440	25 40	52·3

EXPERIMENTS AT BEAVERLODGE, ALBERTA.

By W. D. ALBRIGHT.

Following an extremely dry late summer and autumn in Grande Prairie, the winter of 1914-15 set in in November, the ground being finally closed to the plough on November 11. Winter was steady and mild, —23° being the lowest temperature recorded.

Seeding operations were begun the latter part of March, although most of the grain was sown in April. Cool weather at the outset retarded growth considerably. Frequent showers and a light snowfall at the end of April provided abundant moisture early in the season, but dry weather in June damaged the crops considerably, especially those on stubble. The rainfall in July was heavy, and frequent showers and warm growing weather continued until harvest. Heavy frosts occurred in September, but the grain did not suffer much, as it was practically all in the stook. There was very little wind throughout the summer. On the whole the season of 1915 will rank as a phenomenally good one, and very favourable for grain crops.

The plots of grain, one-sixtieth acre each, were sown at the foot of a hill sloping to the west. The land was not in good condition, owing to the fact that it had been sown with grain for the five years previous, and was consequently very foul with weeds. To destroy these the ground was harrowed or raked by hand.

The varieties tested were grouped in four ranges as follows:—

1st range, oats: Abundance, Ligowo, Eighty Day, Banner and Daubeney.

2nd range, wheat: Marquis, Pioneer, Prelude and Huron.

3rd range, barley: Manchurian, Success and French Chevalier.

4th range, peas: Arthur (Ottawa seed) and a double sized plot of Arthur (home-grown seed from last year's trial plot).

The results were as follows:

Name of Variety.	Date of Sowing.	Date of Ripening.	Yield per acre.		Remarks.
			Bu.	lb.	
Oats:—					
Abundance	April 9	Aug. 24	.	.	Some sheaves consumed by stock.
Ligowo	" 9	" 24	88	8	Poor soil.
Eighty Day	" 9	" 5	88	28	Results confused in threshing. Average of two plots given.
Daubeney	" 9	" 8			Daubeney seemed the better grain.
Banner	" 9	" 24	111	6	Good soil. Rank straw. 16 sheaves. Some thrips.
Wheat:—					
Marquis	April 6	Aug. 26	43		Poor soil
Pioneer	" 6	" 20	37		"
Prelude	" 6	" 16	26		
Huron	" 6	" 30	68		Soil extra good.
Barley:—					
Manchurian	April 23	Aug. 8	42	24	
Success	" 23	" 5		..	Some sheaves consumed by stock. Promised very light yield.
French Chevalier	" 23	" 8	38	36	
Peas:—					
Arthur (Ottawa seed)	April 23	Aug. 31	22	30	
Arthur (home grown seed, double size plot)	" 23	" 31	35		Large plot on better soil than small one.

Special care had been taken to select a uniform piece of land, but subsequent observation after seeding revealed a damper, colder condition of the land and a tardier germination in the case of the plots of Abundance and Ligowo oats, Marquis and Pioneer wheats, Manchurian and Success barley, and the smaller plot of peas sown with Ottawa seed. This explanation will account for the relatively high yield of Huron wheat, 68 bushels per acre; Banner oats, 111 bushels (despite some loss by thrips); and the much smaller though still creditable production of the Marquis wheat and Ligowo oats. The much greater yield per acre of the second plot of peas indicates that the soil variation must have been marked.

REMARKS.

The yields of all the staple varieties indicate a high producing value for Grande Prairie soils.

All the varieties ripened hard, well in advance of autumn frosts.

The very early sown varieties did not give as good results as those sown later, as the more extensive cultivation which these received rendered a greater supply of moisture and nitrate available at the most essential period.

WHEAT.

The high quality and heavy yield of Marquis once more establish its claim to favour.

It is noteworthy that a commercial crop of Marquis adjacent to the plot, but on soil corresponding more nearly to that on which the Huron plot grew, was much longer and stouter in straw and larger in head than the Marquis on the test plot. A 10-acre field of it on a neighbour's farm turned off 45½ bushels per acre, after a month's weathering in mice-infested stooks.

Pioneer is probably not a serious rival of Marquis for this district.

Prelude is more adapted to conditions farther north than Grande Prairie.

Making full allowance for superior natural conditions, the Huron plot distinguished itself, actually producing more pounds of grain per acre than any of the five varieties of oats.

OATS.

All the oats did well, even the early ones giving heavy yields. Through a mishap in threshing, the crops of Daubeney and Eighty Day became mixed, so that only an average of the two can be given. Both did very well indeed, considering their early date of maturity. Daubeney gave greater yield and length of straw, though the Eighty Day ripened three days sooner.

BARLEY.

The yield of the barleys was relatively inferior to that of the other grains. This was likewise true of commercial crops grown in the district, and may have been caused by rust, which was rather bad, particularly on Success. This latter variety, while ripening first, was not otherwise satisfactory, growing thinly on the ground and shattering badly under the most careful handling. Owing to an accident the exact yield of the Success plot is not available, but it was small.

PEAS.

The larger plot of Arthur peas (seeded from the produce of last year's plot) yielded creditably after a month of weathering in bunches. Growth of vine was excellent, maturity fairly even, and sample superb.

BEAVERLODGE.

EXPERIMENTAL STATION, FORT VERMILION, ALTA.

ROBERT JONES, MANAGER.

EXPERIMENTS WITH SPRING WHEAT.

Nine varieties of spring wheat were sown in uniform test plots of one-sixtieth of an acre each.

All wheat sown on land on which a hoed crop had been grown the previous year, seeded at rate of 1¾ bushels per acre, sown on April 15 to April 17. These dates are the earliest on which wheat has been sown in this locality. The season throughout was quite dry, with only a moderate amount of rain-fall during the growing period. After the 15th of June, when the frost occurred, the weather was very warm and continued so throughout the balance of June and all of July and August. The first wheat was cut on August 4 and we continued cutting until the 17th when all wheat was cut at the station.

The yields of straw per acre from the plots were as follows:—

	Tons.	Lb.
Red Fife	2	1,670
Marquis	2	830
Prelude	2	1,320
Bishop	2	1,220
Stanley	2	1,280
Preston	3	1,020
Ladoga	3	72
Early Riga	2	1,800

SPRING WHEAT.—Test of Varieties.

Name of Variety	Date of Sowing.	Date of Ripening.	Number of days maturing.	Average length of straw, including head.	Strength of straw on a scale of 10 points.	Average length of head.	Yield of grain per acre.	Yield of grain per acre.	Weight per measured bushel after cleaning
				Inch.		Inches.	Lb.	Bu. lb.	Lb.
Red Fife	April 15	Aug. 18	125	43	10	3·5	3,420	57 6	64·0
Marquis	" 15	" 16	123	39	10	3·7	2,550	42 30	64·8
Prelude	" 15	" 4	111	36	8	2·5	946	15 46	64·0
Bishop	" 15	" 5	112	38	10	3·0	2,531	42 11	64·1
Stanley	" 16	" 5	111	32	9	2·7	1,440	24 ..	62·1
Preston	" 16	" 13	119	42	6	3·0	3,720	62 ..	64·0
Ladoga	" 16	" 11	117	38	9	3·5	3,300	55 ..	63·5
Early Riga	" 17	" 5	110	30	10	2·5	2,040	34 ..	63·4
Kubanka	" 17	" 14	118	38	6	2·2	2,580	43 ..	65·6

EXPERIMENTS WITH OATS.

Five varieties of oats were sown in uniform plots of one-sixtieth of an acre each, on land that was in hay crop the previous year. The hay on this land was cut in the early part of July, 1914, and as soon as cured was hauled off and the land ploughed. Manure was then applied at the rate of about 15 tons per acre, and disced in and the harrow run over a number of times during the autumn to conserve the moisture.

In the spring of 1915 this land was again disced lightly and then harrowed over with a smoothing harrow.

The seeding was done April 22, at the rate of 2½ bushels per acre. The yields are somewhat low.

The yields of straw from the plots were as follows:—

	Tons.	Lb.
Banner	2	1,400
Tartar King	2	1,160
Improved Ligowo	2	860
Black Mesdag	2	1,640
Excelsior Black	3	1,620

OATS.—Test of Varieties.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of straw including head.	Strength of straw on a scale of 10 points	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per measured bushel after cleaning
				Inches.		Inches.	Lb.	Bu. Lb.	Lb.
Banner	April 22	Aug. 7	107	42	10	8·5	3,267	96 4	37·0
Tartar King	" 22	" 10	110	43	10	9·0	2,299	67 21	38·1
Improved Ligowo	" 22	" 4	104	42	10	8·0	2,178	64 2	35·1
Black Mesdag	" 22	" 3	103	39	7	8·5	2,359	69 13	32·8
Excelsior Black	" 22	" 16	116	42	9	7·7	3,085	90 25	37·0

EXPERIMENTS WITH BARLEY.

The barleys had the same treatment as the oats, and were sown alongside the oats on the same kind of land.

The barleys were sown on April 3 and 4, except Hulless White, which was sown on April 29. The barley was sown at the rate of 2 bushels per acre. All the plots were one-sixtieth of an acre.

The yields of straw obtained from the barleys are as follows:—

	Tons.	Lb.
Mensury	3	360
Claude	3	660
Success	3	120
Champion	3	120
Sidney	3	—
Canadian Thrope	2	1,460
Hulless White	3	780

BARLEY.—Test of Varieties.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of straw including head.	Strenth of straw on a scale of 10 points	Average Length of Head	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per measured bushel after Cleaning.
				Inches.		Inches.	Lb.	Bu. Lb.	Lb.
Mensury (6-row)	May 4	Aug. 4	92	40	7	3·5	3,180	66 12	48·3
Claude (6-row)	" 4	" 4	92	41	8	3·7	3,448	71 40	45·1
Success (6-row)	May 3	July 29	88	35	6	3·0	2,904	60 24	42·3
Champion (6-row)	" 3	" 30	89	42	5	3·5	3,267	67 11	39·2
Sidney (2-row)	" 3	Aug. 3	92	36	10	3·0	2,480	51 32	50·0
Canadian Thorpe (2-row)	" 3	" 3	92	35	10	3·0	2,238	46 30	50·5
Hulless White (6-row)	April 29	Aug. 14	108	36	8	3·0	2,493	51 44	64·0

Success, Champion and Hulless White belong to the class of "hooded" barleys, having no awns.

EXPERIMENTS WITH FIELD PEAS.

Two varieties of field peas were sown in uniform test plots of one-sixtieth of an acre on land that was summer-fallowed the previous year. The plots were sown on April 23, at the rate of 2 bushels per acre. The season was favourable for a really fair test of the varieties. The following results were obtained. The yields of straw obtained were:

	Tons.	Lb.
Arthur	2	1,810
Prussian Blue	2	740

PEAS.—Test of Varieties.

Name of Variety.	Size of Pea.	Date of Sowing	Date of Ripening.	Number of days Maturing.	Average Length of Straw.	Average Length of Pod.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per measured bushel after Cleaning.
					Inches.	Inches.	Lb.	Bu. Lb.	Lb.
Arthur	Large	April 23	Aug. 10	118	46	2·5	2,580	43 ..	65·4
Prussian Blue	Medium	" 23	" 21	120	54	2·0	2,340	39 ..	66·1

BUCKWHEAT.

Two varieties of buckwheat, Silver Hull and Japanese, were sown in plots of one-sixtieth of an acre on May 20, but were completely killed out by the frost in June.

FORT VERMILION.

EXPERIMENTS AT GROUARD, ALBERTA.

REV. BRO. LAURENT, EXPERIMENTALIST.

Spring opened early, about fifteen days in advance of former years.

Seeding was begun the first week in April. The wheat was sown on summer-fallow, and the oats and barley on stubble. The small samples were sown on new breaking. Hot, dry weather which occurred about July 15, when the grain was heading out, checked the growth of straw to a marked degree, but the development of the grain was not seriously affected.

All the grain except Victory oats was ripe and cut before August 21.

Following are the results obtained from the different varieties of grain which were tested this season:—

WHEAT.

Marquis, sown on April 15, ripened on August 14, and gave a yield of 26 bushels 15 pounds per acre.

Preston, sown on April 16, ripened on August 17.

Early Red Fife, sown on April 16, ripened on August 12.

Pioneer, sown on April 14, ripened on August 16, and gave a yield of 40 pounds from 4 pounds of seed.

OATS.

Ligowo, sown on April 17, ripened on August 2.

Abundance, sown on April 19, ripened on August 5.

Victory, sown on April 14, ripened on August 21, and gave a yield of 70 pounds from 3 pounds of seed.

BARLEY.

Odessa, sown on April 28, ripened on August 3.

Manchurian, sown on April 28, ripened on August 5.

Early Chevalier, sown on April 14, ripened on August 5, and gave a yield of 60 pounds from 4 pounds of seed.

The yields of the plots of Pioneer wheat, Victory oats, and Early Chevalier barley were considerably reduced owing to destruction by birds.

EXPERIMENTS AT FORT RESOLUTION, MACKENZIE DISTRICT.

Spring opened very early. Seeding operations were begun the second week in May and were completed by the 26th of the month. The first part of June was very wet and growth was slow. Extremely hot weather prevailed from July 10 to July 22, but this was offset by the abundant rainfall later in the month.

Tests were made of spring wheat, oats, barley, and peas. Oats succeeded better than the other cereals. The experiments with wheat and barley were not very satisfactory, as it was not possible to sow the seed until rather late, and the grain failed to ripen before the autumn frosts. These grains will, however, be tested again next season.

The following varieties of oats were tested: Eighty Day, Ligowo, Pioneer and French Black. Among these, Eighty Day proved the earliest.

Eighty Day, sown May 24, ripened on August 3. The yield from 3 pounds of seed was 55 pounds.

Ligowo, sown on May 24, ripened on September 1. The yield from 4 pounds of seed was 72 pounds.

Pioneer and French Black, sown on May 24, ripened on the same date as Ligowo. The yield of Pioneer was 151 pounds from 7 pounds of seed, and in the case of French Black, 122 pounds from 5 pounds.

Arthur was the only variety of peas tested. It was sown on May 19 and ripened on September 20.

GROUARD.

EXPERIMENTS AT FORT PROVIDENCE, MACKENZIE DISTRICT.

The season of 1915 was on the whole favourable for cereals. The plots, however, suffered considerably from the prolonged drought which occurred in the summer, and from the heavy frosts about the middle of June.

The following varieties of grain were tested: Prelude and Marquis wheats; Manchurian and Success barleys: Eighty Day and Ligowo oats; and Arthur peas. These were all sown on the 23rd of April and ripened between the 25th of July and the 8th of August.

EXPERIMENTS AT FORT SMITH.

The season of 1915 was very unfavourable, owing to the severe drought which prevailed during the spring and the early part of the summer. Heavy frost occurred in May and June, and even July was not free from it.

Seeding was begun early in May and was completed by the 20th of the month.

Tests were made of wheat, oats, and barley. These plots received a severe set-back from the heavy frosts in June.

On the whole very satisfactory results were obtained, considering the nature of the season. The experiments will be repeated next year.

EXPERIMENTAL STATION, INVERMERE, B.C.

G. E. PARHAM, SUPERINTENDENT.

The season of 1915 was exceptionally favourable for cereals. The spring opened early, there was an absence of late frost, and, most important of all, an abundance of rain during the vitally important growing months of June and July. Harvesting was conducted under favourable conditions, and the grain threshed was in every case an excellent sample.

The experiments in this division, which were inaugurated this year, are arranged in a system of rotations, with the idea of supplying the much-needed humus to the soil. This is to be done by alternating crops of cereals and legumes. The legumes used, viz., clover and peas, are ploughed under during the season alternating with the cereal crop. Clover is sown with the cereal as a nurse crop, one cutting is taken off during the next season, and at the time the second cut is ready it is ploughed under. The peas, when sown as the alternating crop, are ploughed under when the pods are commencing to form. The light yield, as will be seen from the accompanying tables, is accounted for by the fact that the work done this year was undertaken without preparation of soil, such as the rotations now inaugurated will provide.

SPRING WHEAT.

Three varieties, as below, were tested on duplicate plots; the following table shows the particulars noted:—

Plot.	Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Yield per acre.	Weight per measured bushel.
					Lb.	Lb.
A.	Huron	April 13	Aug. 12	122	1,320	64
	Marquis	" 13	" 12	122	1,440	67·5
	Pioneer	" 13	" 9	119	1,320	67·0
B.	Huron	April 13	Aug. 12	122	1,360	64·0
	Marquis	" 13	" 12	122	1,400	67·5
	Pioneer	" 13	" 9	119	1,400	67·0

The above plots received one irrigation on June 12.

BARLEY.

Experiments were conducted with barley in duplicate plots with four varieties, two of six-row and two of two-row. The following results were obtained:—

Plot.	Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Yield per acre.	Weight per measured bushel.
					Lb.	Lb.
A.	(Six-row)					
	Manchurian	April 16	Aug. 4	111	1,280	53·0
	Success	" 16	July 27	103	800	49·5
	(Two-row)					
	Early Chevalier	" 16	Aug. 4	111	880	54·0
	Gold	" 16	" 4	111	1,280	54·5
B.	(Six-row)					
	Manchurian	April 16	Aug. 4	111	1,120	53·0
	Success	" 16	July 27	103	820	49·5
	(Two-row)					
	Early Chevalier	" 16	Aug. 4	111	1,040	54·0
	Gold	" 16	" 4	111	1,040	54·5

OATS.

Three varieties were tested in duplicate plots, and gave the following results:—

Plot.	Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Yield per acre.	Weight per measured bushel.
					Lb.	Lb.
A.	Banner	April 13	Aug. 9	119	1,160	43·0
	Daubeney	" 13	" 9	119	1,090	40·0
	Victory	" 13	" 9	119	1,170	42·0
B.	Banner	April 13	Aug. 9	119	1,440	43·0
	Daubeney	" 13	" 9	119	1,290	40·0
	Victory	" 13	" 9	119	1,220	42·0

PEAS.

Five varieties, viz.: Arthur, Chancellor, Golden Vine, Prussian Blue and Solo, were sown on April 13 and were cut on August 14. Unfortunately, while they were ripening out in windrows a sudden windstorm so entangled the different varieties that it was impossible to determine the relative yields.

EXPERIMENTAL FARM, AGASSIZ, B.C.

P. H. MOORE, B.S.A., SUPERINTENDENT.

WEATHER.

The spring of 1915 was one of the earliest on record. All the variety test plots were sown by April 9. The first sowing was done on March 27. The months of April and May were comparatively wet, having over 5 inches of rain each month. June and July had a small amount of precipitation, which, with the good start the small grains received in April and May, tended towards a good development. Excellent harvest weather in August also favoured the small grains and one of the best crops in many years was threshed. The colour and quality of the grain were equal to that of 1914, which was above the average.

The following is an official report on weather conditions between seeding and harvest:—

1915.	April.	May.	June.	July.	August.	Totals.
Inches precipitation	5·37	5·2	2·36	1·62	0·07	14·62
Hours sunshine	139·6	131·0	138·1	195·0	172·0	775·8
Highest temperature	76°	81°	91°	95°	98°	88·2 (aver-
Lowest temperature	31°	35°	42°	40°	45°	38·6 age.)
Mean monthly temperature	50·12	54·27	59·44	62·9	66·22	58·59 "

LAND AND TREATMENT.

The land upon which the cereal crops were grown was sandy loam in nature. It was a portion of the land which grew mangels in 1914 and received the same treatment as our regular four-year rotation. This four-year rotation consists of: fall ploughing of pasture or hay land, ploughing in manure in winter and early spring, spring ploughing and seeding to mangels or corn. Following the hoed crop it is fall ploughed and in the spring it is prepared and seeded to grain with a grass mixture. The two years following this it is used for the production of hay and pasture.

All grains subject to smut were treated with formaldehyde, before sowing, in the following manner: One pound of commercial formaldehyde in 40 gallons of water was put in covered barrels and the grain was placed in sacks, immersed, and soaked for five minutes. It was afterwards spread out on the floor to dry, and sacked up ready for seeding.

SPRING WHEAT.

Six varieties of spring wheat were sown. The yield per acre for all varieties was low. Early Red Fife gave the highest yield with Marquis second, but, calculating on an eight-year average the Marquis gave the highest yield with Early Red Fife second. The "wheat midge" which has always been a factor in our low yield was not so severe in its attack this year as usual, a condition which is possibly due to the early planting.

SPRING WHEAT.—Test of Varieties.

Number	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of straw including head.	Strength of straw on a scale of 10 points	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Annual average yield per acre for 3 years.
					Inches.		Inches.	Lb.	Bu. Lb.	Lb.
1	Marquis	April 9	Aug. 4	117	54	10	3·0	1,500	25 ..	22 20
2	Early Red Fife	" 9	" 4	117	52	10	3·5	1,515	25 15	21 25
3	Red Fife	" 9	" 6	119	52	10	3·5	1,065	17 45	17 45
4	Huron	" 9	" 4	117	53	10	3·5	990	16 30	15 50
	Prelude	" 9	July 29	111	40	9	2·0	1,110	18 30	.. ..
	Pioneer	" 9	Aug. 3	116	50	10	3·0	915	15 15	.. ..

OATS.

Fifteen varieties of oats were tested. The yields of all varieties were good and well in advance of the ordinary years. The Danish Gul-Nesgaard, which matured in one hundred and sixteen days, gave us the heaviest yield. This oat has only been tested two years, and in 1914 was second only to Gold Rain. Comparing yields from a five-year average, the Lincoln, which matured in one hundred and seventeen days this year, gave us the highest yield, followed closely by Banner, Danish Island, and Gold Rain. Of the earliest varieties, Eighty Day, which matured in one hundred and two days, gave the highest yield.

OATS.—Test of Varieties.

Number	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Average Length of straw, including 10 head.	Strength of straw on a scale of points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Annual average yield per acre over period of 5 years.
					Inches.		Inches.	Lb.	Bu. Lb.	Lb.
1	Lincoln	April 9	Aug. 4	117	54	10	10	3,390	99 24	2,302
2	Banner	" 9	" 3	116	55	10	11	3,150	92 20	*2,210
3	Danish Island	" 9	July 31	113	53	10	10	2,910	85 20	2,174
4	Gold Rain	" 9	" 30	112	57	10	11	3,000	88 8	2,140
5	Irish Victor	" 9	" 31	113	52	10	9	2,895	85 5	2,131
6	Twentieth Century	" 9	" 30	112	50	10	11	2,940	86 16	2,100
7	Eighty Day	" 9	" 25	102	44	9	9	2,940	86 16	*1,945
8	Daubeney	" 9	" 20	102	48	10	9	2,235	65 25	*1,835
9	Swedish Select	" 9	" 20	111	44	10	10	2,430	73 8	1,766
	Danish Gul Nesgaard	" 9	Aug. 3	116	56	10	10	3,380	102 12	
	O. A. C. No. 72	" 9	" 3	116	54	10	10	3,360	98 28	
	Victory	" 9	July 30	112	57	10	11	3,000	88 8	
	White Wave	" 9	Aug. 3	116	58	10	10	2,550	75 ..	
	Ligowo, Swedish	" 9	July 29	111	58	10	10	2,550	75 ..	

*Average over a period of 4 years.
†Average over a period of 3 years.

AGASSIZ.

BARLEY.

Fourteen varieties of barley were tested. The general yield of all varieties was above average. Beaver, a two-row type which matured in one hundred and two days, gave the highest yield, and is also highest in the five-year average. For an average of five years this variety is closely followed by Danish Chevalier and Swedish Chevalier, which ripened in one hundred and six and one hundred and eight days, respectively. All varieties were somewhat weak in the straw this season. Success, a six-row beardless type, gave the lowest yield. White Hulless, a six-row type, was also very low in yield.

All the barley plots were sown on April 9.

BARLEY.—Test of Varieties.

Number.	Name of Variety.	Type.	Date of Ripening.	No. of Days Maturing.	Average Length of straw including head.	Strength of straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Annual average yield per acre over a period of 5 yrs.
					Inches.		Inches.	Lb.	Bu. Lb.	Lb.
1	Beaver	2-row	July 19	105	50	5	3·0	3,195	86 27	2,323
2	Danish Chevalier	2-row	" 24	106	48	7	4·0	3,375	70 15	2,186
3	Swedish Chevalier	"	" 26	108	46	8	3·7	2,640	55 ..	2,059
4	Trooper	6-row	" 23	105		7	2·5	3,300	68 36	2,016
5	Oderbruch	"	" 21	103	42	9	2·5	2,895	60 15	1,963
6	Invincible	2-row	" 27	109	44	8	3·0	2,700	56 12	1,944
7	Canadian Thorpe	"	" 24	106	46	10	2·5	2,400	50 ..	1,940
8	O. A. C. No. 21	6-row	" 20	102	44	10	2·5	1,590	33 6	1,824
9	Manchurian	"	" 21	103	40	9	3·0	2,250	46 42	1,748
10	Success (beardless)	6-row	" 16	98	39	8	2·5	1,590	33 6	*1,547
	Gold	2-row	" 23	105	36	8	2·2	2,760	57 24	
	Danish Tystoffe Prentice	"	" 27	109	40	7	3·5	2,430	50 30	
	Odessa	6-row	" 19	101	43	9	2·5	1,590	33 6	
	White Hulless	"	" 19	101	38	8	2·2	1,650	34 18	

*Average yield over a period of 4 years.

FIELD PEAS.

Nine varieties of peas were tested, but they did not have as good an opportunity as the other small grains. They were on a piece of land which proved to be badly infested with quack grass, and the yields were consequently low. The three leading varieties were Solo, Golden Vine, and English Grey, all of which matured in about 130 days. The Solo, which has been tested for two years only, has given excellent results in the field, and as well as yielding a good crop of seed, gave as good a return as green fodder when mixed with oats and appears to be better adapted for this use than any of the other varieties.

PEAS.—Test of Varieties.

Number.	Name of Variety.	Size of Pea.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Average Length of Straw.	Average Length of Pod.	Yield of Grain per Acre.	Yield of Grain per Acre.	Annual average yield per acre over a period of 4 yrs.
						Inches.	Inches.	Lb.	Bu. Lb.	Lb.
1	Solo	Medium	Mar. 27	Aug. 4	131	48	3·5	1,760	29 20	†2,472
2	Golden Vine	Small	" 27	" 3	130	47	2·5	1,910	31 50	1,837
3	English Grey	Medium	" 27	" 4	131	48	3·5	1,640	27 20	1,775
4	Prussian Blue	Medium	" 27	" 4	131	49	3·0	1,590	26 30	1,742
5	Picton	Medium	" 27	" 4	131	48	2·5	1,505	25 5	1,651
6	Chancellor	Small	" 27	" 2	129	47	2·0	1,190	19 50	1,640
7	Prince	Large	" 27	" 6	133	46	3·5	1,305	21 45	1,631
8	Arthur Selected	Medium	" 27	" 2	129	45	3·0	1,540	25 40	1,630

†Average over a period of 2 years.

OATS FOR HAY.

Four varieties of oats were grown for hay and this year gave much larger yields than in previous years in which the trial has been made. For the two previous years Swedish Select has given the biggest yield, but this year it takes second place to Banner. The following is the tabulated result of this test:—

Variety.	Amount seed sown per acre.	Yield per acre.
	Lb.	Tons. Lb.
Banner	85	4 1,300
Swedish Select	85	3 900
Daubeney	85	2 1,400
Ligowo	85	2 700

The quality of the oat hay is much improved by adding peas to the mixture and by sowing a larger quantity per acre. The extra cost of the seed per acre is well paid by the extra yield and quality of the crop grown. The lowest yielding oat in the hay trials was sown at the rate of 3 bushels per acre and 1 bushel of Solo peas per acre was added. From this mixture, 4 tons 1,600 pounds of excellent hay were harvested.

AGASSIZ.

EXPERIMENTAL STATION FOR VANCOUVER ISLAND, SIDNEY, B.C.

LIONEL STEVENSON, B.S.A., M.S., SUPERINTENDENT.

CHARACTER OF THE SEASON.

The remarkably open winter, with its light rainfall and relatively high mean temperatures, permitted the growth of all autumn-sown cereals adapted for the conditions. As a result, Arlington Awnless barley was 30 inches high and headed out on March 26. Volunteer plants of Marquis wheat, Victory, and Banner oats, Tapp and Mensury barley were from 12 to 20 inches high, April 1.

The rainfall, temperatures and sunshine for the growing season were as follows:—

Month.	Rainfall.	Temperatures.			Sunshine.	
		Max.	Min.	Mean.		
	Inches.	°	°	°	Hours.	Minutes.
October	3·63	66·0	39·0	51·90	94	48
November	8·20	56·0	32·0	46·30	46	3
December	1·21	41·6	34·0	37·80	72	56
January	2·77	49·0	27·5	38·50	70	4
February	1·66	51·0	31·0	41·60	65	9
March	1·65	64·0	35·0	47·0	142	7
April	1·65	70·0	35·0	51·0	223	4
May	2·06	75·5	40·0	55·0	181	2
June	0·74	86·0	46·0	59·95	304	0

The soil of the cereal test plot area is a light loam on a clay-gravel hard-pan. The land has been but recently cleared and had been cultivated only one year. Four varieties each of autumn-sown wheat and rye were under test; two varieties of winter barley, and one variety of winter oats were also tested. The wheat, oat, and barley plots suffered much from lack of drainage, and consequently did not produce heavily.

Four varieties of spring-sown barley, three varieties of oats, two varieties of peas, and one variety of flax and three varieties of spring wheat were also tested. These all gave fairly uniform results considering that the soil had been but recently brought under cultivation.

The results of all cereal test-plot work are given in the following tables:—

TEST PLOTS of Autumn-sown Cereals.—Season 1914-15.

Variety.	Size of plot.	Quantity of seed sown per acre.	Date of Sowing.	Date of Germination.	Date of Heading.	Date of Cutting.	Length of Straw.	Yield of straw per acre.	Yield of grain per acre.
	Acre.	Bush.					Ft. In.	Lb.	Lb.
Barley Arlington Awnless	1/15	1	Sept. 28	Oct. 7	Mar. 23	June 2	4 10	3,216	1,440
Oat New Zealand	1/63	1/2	" 28	" 9	May 22	July 17	3 7	2,646	1,008
Barley Tapps Winter	1/17	1/2	Oct. 9	" 22	" 10	" 9	3 6	2,160	984
Wheat Tasmanian Red	1/4	1 1/4	" 3	" 12	" 8	" 12	4 3	3,188	920
Wheat Dawsons Golden Chaff	1/4	1 1/4	Sept. 28	" 7	" 8	" 12	4 8	2,772	1,047
Wheat Turkey Red	1/4	1 1/4	" 28	" 7	" 12	" 12	4 3	3,132	576
Wheat Egyptian Amber	1/4	1 1/4	Oct. 3	" 12	" 14	" 12	4 6	3,204	856
Wheat Buda Pesth	1/4	1 1/4	Sept. 28	" 7	" 8	" 22	4	2,392	781
Rye Thousandfold	1/4	1 1/2	Oct. 5	" 14	April 25	" 13	6	4,080	1,237
Rye Mammoth White	1/4	1 1/2	" 5	" 14	" 22	" 14	6 6	3,048	962
Rye Dominion	1/4	1 1/2	" 5	" 15	" 25	" 14	5 9	2,944	1,008

TEST PLOTS of Spring-sown Cereals.

Variety.	Size of Plot.	Quantity of seed Sown per acre.	Date of Sowing.	Date of Germination.	Date of Heading.	Date of Cutting.	Length of Straw.	Yield of straw per acre.	Yield of Grain per acre.
	Acre.	Bush.					Ft. In.	Lb.	Lb.
Wheat Huron	1/4	2	April 14	April 20	June 20	Aug. 10	3 10	880	1,452
" Marquis	1/4	2	" 14	" 20	" 12	" 10	4 ..	1,260	1,641
" Red Fife	1/4	2	" 14	" 20	" 18	" 10	4 3	1,476	2,037
Barley Manchurian	1/4	2	" 14	" 20	" 10	July 22	3 8	1,376	1,689
" Canadian Thorpe	1/4	2	" 14	" 20	" 12	" 22	3 6	1,924	1,676
Oat Victory	1/4	3	" 14	" 21	" 18	Aug. 3	4 6	2,392	1,249
" Daubeney	1/4	3	" 14	" 21	" 12	July 22	3 3	2,356	1,465
" Banner	1/4	3	" 14	" 22	" 23	Aug. 3	4 9	3,184	1,579
Peas Arthur	1/10	2	" 17	" 26	Flower June 23 Podded July 1	" 14	4 8	1,475	2,112
" Pigeon	1/10	1 1/2	" 17	" 26	Flower June 21 Podded June 30	" 14	4 3	1,580	2,464
Barley Beardless	1/10	1 1/2	" 17	" 24	" 5	July 22	3 6	1,712	2,100
" Hulless	1/10	1 1/2	" 17	" 24	" 9	" 22	3 2	2,390	836
Flax	1/10	40 lbs.	" 17	" 23	Flowered June 18	Aug. 10	2 8	1,350	924

The 1915 autumn-sown cereal plots withstood the winter, and on March 15, 1916, presented appearances which indicated various degrees of hardiness and suitability to the district. Listed in order according to degree of vigour and freedom from winter killing.

Rye: Thousand Fold, Dominion, Mammoth White, Petkus.

SIDNEY.

Wheat: Saanich No. 1, Egyptian Amber, Benefactor, Dawson's Golden Chaff, Buda Pesth, Tasmanian Red, Sun, Bluestem.

Three varieties of spring wheat were sown in the autumn and came through the winter in exeellent condition. The plots of Huron and of Red Fife were looking better than any of the plots of established autumn varieties, demonstrating the possible usefulness of these varieties in winter forage crop mixtures.

Plots of Arthur and Maple peas were sown, but the winter proved too severe, and killed about 75 per cent of the plants.

Four plots of vetch were sown, the winter, the spring, and selections from two native varieties. The plot of spring vetch grew more vigorously during the autumn than any of the others and withstood the winter in good form, demonstrating that it ean be used in this district as an autumn crop.

OATS.

Five plots of established winter varieties of oats were sown; three of these withstood the winter in perfect form. The variety Fulghum gives promise of being the most vigorous grower.

Two plots of spring oats, namely, Victory and Saanich No. 1, were sown at the same time as the established winter varieties; these winter-killed to the extent of 50 per cent.

Listed in order, according to degree of vigour and freedom from winter killing: Fulghum, Winter Turf, New Zealand, Black Alaska, Grey Winter, Saanich No. 1, Victory.

SIDNEY.